LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA26 | Washwood Heath to Curzon Street

Data appendix (LQ-001-026)

Land quality

November 2013

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Environmental topic:	Land quality	LQ
Appendix name:	Land quality data appendix	001
Community forum area:	Washwood Heath to Curzon Street	026

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1 Introduction

1.1.1 The land quality appendix for the Washwood Heath to Curzon Street community forum area (CFA) comprises:

- a summary of engagement undertaken (Section 2);
- detailed risk assessment (Section 3);
- inspection notes and other site data (Section 4);
- geological sites of special scientific interest (SSSI) and local geological sites (LGS) (Section 5); and
- mining and minerals data (Section 6).

1.1.2 Maps referred to throughout the land quality appendix are contained in Volume 5: Land Quality Map Book.

2 Engagement

2.1.1 Table 1 sets out the local authorities and other organisations that have been engaged with during the preparation of the land quality section of the environmental impact assessment for the Washwood Heath to Curzon Street study area, the types of information that have been provided to the assessment team and any specific concerns of those engaged with.

Table 1: Engagement on land quality issues undertaken for the study area

Local authority or other organisation	Method / dates of contact	Information provided and/or specific concerns
Birmingham City Council (BCC)	Contacted via e-mail/telephone/in person from July 2012 – present	Contacted regarding collection and viewing of site investigation reports (including data recovery issues) from BCC's archive. Included the collection and return of a series of boxes of reports/files one at a time.
	Meeting on 28 November 2012	Meeting between land quality team and BCC Environmental Protection Officer (EPO) – consultation regarding contaminated land designations. Minutes issued on 20 December 2012.
	Contacted via e-mail from December 2012 – January 2013	Consultation regarding confidential borehole logs held by British Geological Survey (BGS), unexploded ordnance (UXO) records and geographical information system (GIS) shape files of disused tanks. UXO data received. GIS shape files for disused tanks sent by BCC EPO on 28 January 2013.
	Contacted via e-mail during April 2013	Correspondence with BCC EPO regarding proposed meeting with the intention to discuss specific aspects of the Proposed Scheme and some of the key sites with which it will interact.
	Meeting on 9 May 2013	Meeting to discuss specific aspects of the scheme and some of the key sites it will interact with. Attendees: land quality team and BCC EPO. Agreed to provide a request to BCC for any further specific site investigation reports required as a result of recent design alterations. BCC have subsequently been providing any associated relevant information to date.
Environment Agency	Contacted via e-mail/telephone from March 2013 – May 2013	A request was made for information on landfill sites and special or potentially contaminated sites within study area. This was followed up by a telephone call on 11 March 2013 from which it was confirmed that the request had been passed on to the Midlands customer service desk with a response due by 19 March 2013. A request for a GIS file for the area was received on 15 March 2013 and the GIS file was sent on 18 March 2013. A reply was received on 16 May 2013, but attachments were missing; an email was sent on 20 May 2013 requesting the attachments which were received on the same day. A telephone request (12 March 2013) was also made for the Environment Agency to identify a person to meet with to discuss potential groundwater pollution issues on the route; this was followed up by e-mail on 18 March 2013 in the absence of a response. In mid May 2013, a collective approach was made to the Environment Agency by all land quality teams requesting information regarding specific landfill sites and other sites of interest. A response was received on the 7 August 2013 containing the available

Local authority or other organisation	Method / dates of contact	Information provided and/or specific concerns
		records.
West Midlands Fire Service (WMFS)	Contacted via e-mail/telephone/in person from April 2013 – August 2013 (Meeting on 9 May 2013)	Enquiry regarding sites identified for possible bulk fuel storage and arrangement of specific site searches to be undertaken. Including a meeting between the land quality project team and the WMFS to discuss required searches. It was highlighted during correspondence that normally, before beginning any environmental searches, the Petrol Licensing Authority requires authorisation from the landowners to release any information and this was requested of the land quality team. During the meeting on the 9 May 2013, it was agreed that the land quality project team would prioritise the sites to those of particular interest. A reduced shortlist of 16 sites to be searched was provided. The results of the first search were sent on the 12 June 2013 to confirm it met with the project team's requirements; this was confirmed. Since then, the search results have continued to be received as and when they are completed; any associated search-specific queries have been clarified as and when the results are received. Searches were completed week ending 4 August 2013.
The Coal Authority	N/A	Not consulted as area is remote from coal mining development referral risk zone.

3 Detailed risk assessment

3.1.1 This section presents assessments for the higher risk potentially contaminated sites within the study area. For each site the following data is presented:

- baseline risk assessment;
- construction risk assessment;
- post-construction risk assessment; and
- assessment of temporary (construction) and permanent (post-construction) effects.

3.1.2 Grouping has been applied in accordance with the Land Quality Technical Note presented in the Scope and Methodology Report (SMR) Addendum in Appendix CT-001-000/2, in Volume 5.

3.1.3 The purpose of the grouping is to enable the assessment of a large number of sites within the study area that share similar characteristics. The grouping as part of the detailed assessment considers the type of contamination, for example soil/groundwater contamination with or without a potential for ground gas to also be present. It also seeks to differentiate between potentially contaminated sites that fall directly within the land required to construct the Proposed Scheme and those which fall outside.

3.1.4 The groups are defined as:

- conceptual Site Model (CSM) Group A: Sites* that fall fully/partially within the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination and ground gas;
- CSM Group B: Sites* that fall fully/partially within the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination only;
- CSM Group C: Sites* that fall outside of the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination and ground gas; and
- CSM Group D: Sites* that fall outside of the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination only.

*'Sites' are defined as the Stage C potentially contaminated sites that have been identified following the screening process in Stages A and B [1].

3.1.5 The assessment of grouped sites is considered to be a high level assessment that is designed to distinguish between the key interactions that the different groups of potentially contaminated sites would have with the construction and post-construction stages of the Proposed Scheme. For the purpose of the grouped assessments the term "on-site users" refers to users of the potentially contaminated sites identified.

[1] These stages are described in the assessment methodology, set out in the SMR (Volume 5: Appendix CT-001-000/1) and the SMR addendum (Volume 5: Appendix CT-001-000/2).

3.1.6 Selected more detailed site-specific assessments are presented for key areas where significant earthworks are planned in either (i) an area of potential contamination, or (ii) a particular sensitive environment. These assessments are more focused and consider both the interaction between potentially contaminated sites within the land required to construct the Proposed Scheme, as well as those outside of this (but within the study area). Potentially contaminated sites included that are outside of the area being assessed are generally sites which neighbour the land required to construct the Proposed Scheme. For the site specific assessment, the term "on-site users" refers to the current sites users of the areas required for construction as opposed to users of the neighbouring sites assessed.

3.1.7 Contaminant types included within the risk assessments are based on the Department of the Environment, Farming and Rural Affairs (DEFRA) and Environment Agency (2002), *Potential Contaminants for the Assessment of Land* (CLR 8)[2] . Although this report has been withdrawn by the Environment Agency, there has been no subsequent authoritative document to replace it and it is still commonly used and considered good practice.

3.1.8 The remainder of this section presents the risk assessment for the sites going through to Stage C and D of the assessment. These sites are shown on Volume 5: Maps LQ-01-068b, LQ-01-069 and LQ-01-070.

3.1.9 The following abbreviations are used in these tables:

- CSM - conceptual site model;
- CoCP - code of construction practice;
- PAH - polycyclic aromatic hydrocarbons;
- PCB - polychlorinated biphenyls;
- PPE - personal protective equipment;
- Ramsar sites - wetlands of international importance, designated under the Ramsar Convention[3];
- SSSI - site of special scientific interest; and
- VOC - volatile organic compound.

3.1.10 The assessment that follows has not assessed new or diverted utilities that will be located within the boundaries of existing highways. These are scoped out of the assessment as although there is work below ground, it is predominantly within highway construction i.e. non-contaminative materials. These are low risk with regard to land contamination issues, and therefore unlikely to cause any significant land quality effects.

[2] DEFRA and Environment Agency, (2002), *Potential Contaminants for the Assessment of Land (CLR 8).*

[3] Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987.

Detailed risk assessment - Group A

Table 2: Detailed risk assessment for Group A sites in the study area

Site ID (IDS)	26-6, 26-7, 26-11, 26-12, 26-22, 26-34, 26-35, 26-36, 26-45, 26-63, 26-65, 26-66, 26-72, 26-74, 26-75, 26-77, 26-161, 26-162 and 26-230
Community forum area	Washwood Heath to Curzon Street
Site group	Group A: sites that fall fully / partially within the land required to construct the Proposed Scheme, affected by soil / groundwater contamination and ground gas
Site title (Site ID) and land use class[4]	Unspecified yard/vehicle storage/former refuse heap (assumed infilled/levelled) (26-6), class 3 historical land use. Various class 2 industrial units/uses/former refuse heap (assumed infilled/levelled) (26-7), class 3 historical land use. UK Mail depot including fuel filling area/former refuse heaps/gravel pits (assumed infilled/levelled); historical landfill ("Land Rear of Freight Rover Works") (26-11), class 3 current and historical land use. Derelict land (former Leyland DAF Vans (LDV) site)/former refuse heaps/gravel pits (assumed infilled/levelled); historical landfill ("Land Rear of Freight Rover Works") (26-12), class 3 historical land use. Former Alstom works site/former Midland Railway Carriage and Wagon works - including tanks and mounds/pits (assumed levelled/infilled); infilled and worked ground (26-22), class 3 current and historical land use. Undeveloped land; roads/former gas works; gravel/sand pit (assumed infilled) (26-34), class 3 historical land use. Vauxhall Lookers garage/former disturbed ground/pit (assumed infilled); gas works (26-35), class 3 historical land use. Various class 2 industrial units/uses including Cemex UK Materials Ltd (including various tanks infilled ground (26-36), class 3 current and historical land use. Gas works/former disturbed ground/pit (assumed infilled); gas works (26-45), class 3 current and historical land use. Class 1 unit at Saltley Business Park/former pit(s) (assumed infilled) (26-63), class 3 historical land use. Class 2 units at Saltley Business Park/former pit/reservoir (assumed infilled) (26-65), class 3 historical land use. Unclassified Saltley Business Park/former reservoir (assumed infilled) (26-66), class 3 historical land use. Undeveloped land; Heartlands Parkway/former pit (assumed infilled); gas works (26-72), class 3 historical land use. Undeveloped land; Heartlands Parkway; railway/former canal reservoir (assumed infilled) (26-74), class 3 historical land use. Class 1 unit at Saltley Business Park/worked ground (assume infilled) (26-75), class 3 historical land use.

[4] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[5]	Unspecified unit at Saltley Business Park (assumed class 1)/former reservoir (assumed infilled); worked ground (assumed infilled) (26-77), class 3 historical land use. Railway depot/sidings; tanks; waste heap/former quarry/pit/refuse heap/slag heap (assumed infilled/levelled) (26-161), class 3 current and historical land use. Various class 2 industrial units/uses and waste heap/former Magnet Works (including tanks); quarry/pit (assumed infilled) (26-162), class 3 current and historical land use. Public open space/former oil depot; worked ground (assumed infilled) (26-230), class 3 historical land use.
Receptors	
Sensitive land use e.g. housing, schools, parks, playgrounds (adjacent and/or <50m)	Residential housing (Washwood Heath, Ward End, Bromford, and Birmingham city centre), Leigh Junior, Infant and Nursery School, hotel and public open space/parks. Commercial areas.
Aquifer e.g. Secondary A or Principal	Superficial: Secondary A (Alluvium / River Terrace/Glacial Deposits). Bedrock: Principal (Bromsgrove Sandstone Formation) and Secondary B (Mercia Mudstone).
Surface watercourses (adjacent and/or <50 m)	River Tame, drain, Washwood Heath Brook, boating lake, River Rea, River Rea Overflow Channel and Grand Union Canal.
Geological or ecological designations e.g. SSSI or Ramsar	None.
Property e.g. mineral resources, buildings and structures, Grade 1 agricultural land	No significant mineral resources. Residential and commercial buildings and infrastructure present throughout. Buildings and structures (potentially affected by ground gas).
Other	Rail users at stations (post-construction only).
Post-construction development	
Bromford tunnel west portal, Washwood Heath depot, viaducts, Curzon Street station and main line works/infrastructure.	

[5] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Table 3: Baseline CSM and qualitative risk assessment for Group A sites

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Low	Medium	Moderate/low risk
	On-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Unlikely	Medium	Low risk
	Off-site users - residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Unlikely	Medium	Low risk
	Off-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Unlikely	Medium	Low risk
	Controlled waters – groundwater (Principal and Secondary A aquifer)	Vertical and lateral migration.	Low	Medium	Moderate/low risk
Soil, leachate and groundwater	Controlled waters – surface waters (River Tame, drain, Washwood Heath Brook, boating lake, River Rea, overflow channel to River Rea and Grand Union Canal)	Groundwater migration, direct run-off from site.	Low	Medium	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases.	Low	Medium	Moderate/low risk
	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions Sites assessed without construction of the Proposed Scheme. N/A is not applicable as there are no ecological / geological designations in this study area.					

Table 4: Construction CSM and qualitative risk assessment for Group A sites

Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk with construction stage mitigation**
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide. .	On-site users - residential.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users - commercial/public open space.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - residential.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Unlikely	Medium to severe	Low risk to moderate/low risk
	Off-site users- commercial/public open space.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Unlikely	Medium to severe	Low risk to moderate/low risk
	Controlled waters – groundwater (Principal and Secondary A Aquifer).	Vertical and lateral migration.	Low	Medium to severe	Moderate/low risk to moderate risk
	Controlled waters – surface waters (River Tame, drain, Washwood Heath Brook, boating lake, River Rea, River Rea Overflow Channel and Grand Union Canal).	Groundwater migration, direct run-off from site.	Low	Medium to severe	Moderate/low risk to moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Property receptors – buildings, foundations, and services (on-site and off-site).	Exposure to explosive gases.	Low	Medium to severe	Moderate/low risk to moderate risk
	Ecological/geological designations.	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

During construction standard mitigation procedures are assumed to be implemented in accordance with the CoCP. Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable, as on-site users have been removed from the construction stage CSM as they will not be present during construction; or as there are no ecological/geological designations in this study area.

Whilst the CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface run-off and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.

Ground investigation will be required prior to and during construction.

Assumes construction phase includes remediation that may be required.

Table 5: Post-construction CSM and qualitative risk assessment for Group A sites

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.	On-site users - residential.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low risk to low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low risk to low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	On-site users - commercial, public open space, rail users at Curzon Street station.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low risk to low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low risk to low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	Off-site users – residential.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low risk to low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low risk to low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	Off-site users - commercial/public open space.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to minor	Very low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	Controlled waters – groundwater (Principal and Secondary A Aquifer).	Vertical and lateral migration.	Unlikely	Negligible to medium	Very low risk to low risk
Residual soil, leachate, and groundwater contamination. Ground gas.	Controlled waters – surface waters (River Tame, drain, Washwood Heath Brook, boating lake, River Rea, River Rea Overflow Channel and Grand Union Canal).	Groundwater migration, direct run-off from site.	Unlikely	Negligible to medium	Very low risk to low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Property receptors – buildings, foundations, and services (on-site and off-site).	Exposure to explosive gases	Unlikely	Negligible to medium	Very low risk to low risk
	Ecological/geological designations.	Vertical and lateral migration, direct contact	N/A	N/A	N/A

Notes / assumptions

Assumes remediation required has been undertaken and construction works are complete.

'On-site users' excludes rail passengers (as whilst within trains, will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction.

N/A is not applicable as there are no ecological/geological designations in this study area.

A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 6: Significance of impact during construction and post-construction for Group A sites

Contaminant linkage	**Baseline**	**Construction**	**Post-construction**	**Construction impact**	**Post-construction impact**
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Exposure to soil contamination - on-site users (residential).	Moderate/low risk	N/A	Very low risk to low risk	N/A	Minor beneficial to moderate beneficial
Exposure to groundwater contamination - on-site users (residential).	Moderate/low risk	N/A	Very low risk to low risk	N/A	Minor beneficial to moderate beneficial
Exposure to ground gas - on-site users (residential).	Moderate/low risk	N/A	Very low risk to low risk	N/A	Minor beneficial to moderate beneficial
Exposure to soil contamination – on-site users (commercial/public open space) (station rail users post-construction only)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial
Exposure to groundwater contamination – on-site users (commercial/public open space) (station rail users post-construction only)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial

Contaminant linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Exposure to ground gas – on-site users (commercial/public open space) (station rail users post-construction only)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial
Exposure to soil contamination - off-site users (residential)	Low risk	Low risk	Very low risk to low risk	Negligible	Negligible to minor beneficial
Exposure to groundwater contamination – off-site users (residential)	Low risk	Low risk	Very low risk to low risk	Negligible	Negligible to minor beneficial
Exposure to ground gas – off-site users (residential)	Low risk	Low risk to moderate/low risk	Very low risk to low risk	Negligible to minor adverse	Negligible to minor beneficial
Exposure to soil contamination – off-site users (commercial)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (commercial)	Very low risk	Very low risk	Very low risk	Negligible	Negligible

Contaminant linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Exposure to ground gas – off-site users (commercial)	Low risk	Low risk to moderate/low risk	Very low risk to low risk	Negligible to minor adverse	Negligible to minor beneficial
Contaminated soil, leachate/groundwater and pollution of aquifers	Moderate/low risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible to minor adverse	Minor beneficial to moderate beneficial
Contaminated soil, leachate/groundwater and impact on surface watercourses	Moderate/low risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible to minor adverse	Minor beneficial to moderate beneficial
Impact on property receptors	Moderate/low risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible to minor adverse	Minor beneficial to moderate beneficial
Impact on ecological/geological designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Negligible to minor adverse	Negligible to moderate beneficial
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.					

Detailed risk assessment - Group B

Table 7: Detailed risk assessment for Group B sites in the study area

Site ID (IDS)	26-1, 26-42, 26-44, 26-53, 26-61, 26-62, 26-73, 26-79, 26-83, 26-92, 26-108, 26-130, 26-131, 26-132, 26-133, 26-134, 26-135, 26-136, 26-160, 26-172, 26-173, 26-182, 26-194, 26-195, 26-196, 26-197, 26-198, 26-199, 26-200, 26-214, 26-215, 26-216, 26-217, 26-218, 26-219, 26-220, 26-226, 26-228, 26-231, 26-232, 26-235, 26-236, 26-238, 26-252, 26-254, 26-257, 26-258, 26-285, 26-314, 26-316, 26-317, 26-318, 26-319, 26-320, 26-327, 26-328, 26-329, 26-344, 26-345, 26-362, 26-363, 26-364, 26-369, 26-374, 26-377, 26-380 and 26-389
Community forum area	Washwood Heath to Curzon Street
Site group	Group B: sites which fall fully / partially within the land required to construct the Proposed Scheme, affected by soil/groundwater contamination only
Site title (Site ID) and land use class[6]	Railway land use (26-1), class 2 current and historical land use. Hampton by Hilton Birmingham Star City (hotel)/former gas works (26-42), class 3 historical land use. Undeveloped land; Heartlands Parkway/former refuse destructor/unspecified structures/units (likely former class 2 use) (26-44), class 2 historical land use. H W Taroni Metals Ltd (scrap metal); Aston Sheds/car wash /former railway land use and likely class 2 use (26-53), class 2 current and historical land use. Undeveloped land; Heartlands Parkway/former railway land use; Aston Church Trading Estate (26-61), class 2 historical land use. Class 1 units at Saltley Business Park/former Saltley Works (Railway Carriage and Wagon) (26-62), class 2 historical land use. Undeveloped land; Heartlands Parkway; the B4114 Saltley Viaduct/former gas works (26-73), class 3 historical land use. Unspecified (assumed class 1) and class 1 units at Saltley Business Park/former Saltley Works (Railway Carriage and Wagon) including tanks/likely tanks (26-79), class 3 historical land use. Unclassified Saltley Business Park/former Saltley Works (Railway Carriage and Wagon) (26-83), class 2 historical land use. Gate Street Hostel/former works (26-92), class 2 historical land use.

[6] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[7]	Mainstream Industrial Park (excluding printers) /former gas works (26-108), class 3 historical land use. West Midlands Signalling Centre/former Duddeston Saw Mill (26-130), class 2 historical land use. TNT Express (UK) Ltd depot/former gas works (26-131), class 3 historical land use. Network Park Industrial Estate/former gas works (26-132), class 3 historical land use. Undeveloped land; skip storage/former Corporation Yard (26-133), class 1 historical land use. Booker Wholesale; Aziz Textiles Ltd (fabric importers, wholesalers and retailers/textile merchants) (26-134), class 1 current land use. J. Goley Salvage (car recycling/second hand/dismantlers/scrap) (26-135), class 2 current land use. City Metals Ltd (scrap yard); Motorguard (car alarm/car radio/car wash)/former Corporation Yard; unspecified (26-136), class 2 current land use. Duddeston Mill Trading Estate/former gasometer/tank (26-160), class 3 historical land use. Network Rail Saltley Depot/likely former class 2 use; railway land use (26-172), class 2 current and historical land use. Freightliner Ltd container terminal/former oil tanks; petrol depot (26-173), class 3 historical land use. Various class 2 industrial units/uses (26-182), class 2 current land use. J Nicklin & Sons Ltd (timber cases, pallets and components) (26-194), class 2 current land use. Demolition contractors yard/former depot (26-195), class 2 current and historical land use. Various class 2 industrial units/uses (26-196), class 2 current land use. Timber storage yard/saw mill; roadways Container Logistics Ltd (couriers)/former vehicle repair works (26-197), class 2 current and historical land use. Old manufacturing unit (possible small scale ironworks) (26-198), class 3 current land use. Freight terminal (depot)/former Lawley Street Goods Station (26-199), class 2 current and historical land use. Liquid Print (under viaduct)/viaduct (26-200), class 3 current land use. Lawley Middleway/former factory (26-214), class 2 historical land use Safe Side In Eastside (safety learning centre) including tank/former metal works (26-215), class 3 current and historical land use

[7] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[8]	West Midlands Fire Service HQ offices/former dairy produce works (26-216), class 2 historical land use. Various class 2 or likely class 2 industrial units/uses (26-217), class 2 current land use. Various class 2 industrial units/uses built into railway viaduct arches/viaduct (26-218), class 2 current and historical land use. Texaco Ash Motor Services Vauxhall Road (fuel station entry) (open) (26-219), class 3 current land use. House of Rock (retail)/former engineering works (26-220), class 2 historical land use. Eastside Locks cleared development site (including recent 'Design Print')/former Belmont Metal Works (26-226), class 3 current and historical land use. KBT self-container storage; car park/skips/port-a-cabins/ former railway land use (26-228), class 2 historical land use. Car parking/former Curzon Street Goods Station; tank (26—231), class 3 historical land use. Former Curzon Street Station building (current and historical) (26-232), class 2 current and historical land use. Café/former tanks (26-235), class 3 historical land use. MK Building and Civil Engineering; 'Man for a Van' Dealers (26-236), class 2 current land use. Volkswagen showroom and garage/former wire cable; wire rope works (26-238), class 2 current and historical land use. Lawley Middleway/former smithy; garage; food factory (26-252), class 2 historical land use. Watery Lane Middleway/former motor repair works; works; scrap yard (26-254), class 2 historical land use. Watery Lane Middleway/former motor salvage yard (26-257), class 2 historical land use. Commercial; retail; offices/former engineering works; motor components depot (26-258), class 2 historical land use. Watery Lane Middleway; St Andrew's Road Bolton Street/ former works (26-285), class 2 historical land use A.G. Warre and Son Ltd (electroplaters)/former works (26-314), class 2 current and historical land use Vacant cleared derelict brownfield land in industrial/ commercial area; various class 2 industrial units/uses/ various former works; warehouses (26-316), class 2 current and historical land use. Park Street Gardens (cemetery) (26-317), class 1 current and historical land use

[8] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[9]	Car parking/former printing works; Phoenix Foundry (iron) (26-318), class 3 historical land use. Apparent construction works compound (assumed class 2); electricity sub-station/former electricity office (26-319), class 2 current land use. Moor Street station/former railway land use; goods shed; works (26-320), class 2 current and historical land use. Various class 1 units/uses (26-327), class 1 current land use. Express Valeting Service (car wash services) and unspecified works/various former works; garage (26-328), class 2 current and historical land use. Taboo Cinema Club and car park; warehouse/former warehouse (26-329), class 1 current and historical land use. William Marston Ltd (upholstery supplier)/former depot (26-344), class 2 current and historical land use. Proof House Business Park partially under viaduct (light industrial)/disused tank (slurry filled) (26-345), class 3 historical land use. Public open space/former machine tool works; transport service depot; works (26-362), class 2 historical land use Public open space/former builders merchant's depot including tank; oil depot including tanks (26-363), class 3 historical land use. Residential/former Park Street Gardens including ponds (assumed infilled - small (~5-10 m diameter) so class 2 assumed) (26-364), class 2 historical land use. Moor Street Queensway/former works (26-369), class 2 historical land use. Moor Street Queensway/former warehouse (26-374), class 1 historical land use. Commercial; retail; offices; residential/various former works (26-377), class 2 historical land use. Commercial; retail; offices/former warehouse (26-380), class 1 historical land use. Moor Street Queensway; Masshouse Lane; residential/ former transport depot; repair works (26-389), class 2 historical land use.
Receptors	
Sensitive land use e.g. housing, schools, parks, playgrounds (adjacent and/or <50m)	Housing (Washwood Heath, Ward End, Bromford, Nechells and Birmingham city centre), hotels, schools and public open space/parks. Commercial areas.
Aquifer e.g. Secondary A or Principal	Superficial: Secondary A (Alluvium / River Terrace/Glacial Deposits). Bedrock: Principal (Bromsgrove Sandstone Formation) and Secondary B (Mercia Mudstone).
Surface watercourses (adjacent and/or <50 m)	River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal, pond and Digbeth Branch Canal.

[9] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Geological or ecological designations e.g. SSSI or Ramsar	None
Property e.g. mineral resources, buildings and structures, Grade 1 agricultural land	No significant mineral resources. Residential and commercial buildings and infrastructure present throughout.
Other	Rail users at stations.
Post-construction development	
Bromford tunnel west portal, Washwood Heath depot, viaducts, Curzon Street station and main line works/infrastructure.	

Table 8: Baseline CSM and qualitative risk assessment for Group B sites

Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk at baseline without mitigation**
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users – commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential, schools	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater (Principal and Secondary A Aquifer)	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface waters (River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal, pond and Digbeth Branch Canal)	Groundwater migration, direct run-off from site.	Low	Medium	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	Property receptors – buildings, foundations and services (on-site and off-site).	Exposure to explosive gases.	N/A	N/A	N/A
	Ecological/geological designations.	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions Sites assessed without construction of the Proposed Scheme. N/A is not applicable, due to grouping assumption that Group B sites are not affected by ground gas or there are no ecological / geological designations in this study area.					

Table 9: Construction CSM and qualitative risk assessment for Group B sites

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis and PCB.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users – commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential, schools	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – commercial/public open space.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater (Principal and Secondary A Aquifer).	Vertical and lateral migration.	Low	Medium to severe	Moderate/low risk to moderate risk
	Controlled waters – surface waters (River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal, pond and Digbeth Branch Canal)	Groundwater migration, direct run-off from site.	Low	Medium to severe	Moderate/low risk to moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	Property receptors – buildings, foundations and services (on-site and off-site).	Exposure to explosive gases.	N/A	N/A	N/A
	Ecological/geological designations.	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

During construction standard mitigation procedures are assumed to be implemented in accordance with the CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management.

N/A is not applicable, as on-site users have been removed from the construction stage CSM as they will not be present during construction; or due to grouping assumption that Group B sites are not affected by ground gas.

Whilst the CoCP will make it unlikely that there will be adverse consequences, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the CoCP generally results in a low or unlikely probability, but in some cases the consequence may temporarily increase from that defined at baseline. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.

Ground investigation will be required prior to and during construction.

Assumes construction phase includes remediation that may be required.

Table 10: Post-construction CSM and qualitative risk assessment for Group B sites

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate and groundwater contamination	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low to low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low to low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users– commercial, public open space and rail users at Curzon Street station.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low to low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low to low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential, schools.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low to low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate and groundwater contamination		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low to low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users(A) – commercial/public open space.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to minor	Very low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater (Principal and Secondary A Aquifer).	Vertical and lateral migration.	Unlikely	Negligible to medium	Very low risk to low risk
	Controlled waters – surface waters (River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal, pond and Digbeth Branch Canal).	Groundwater migration, direct run-off from site.	Unlikely	Negligible to medium	Very low risk to low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate and groundwater contamination	Property receptors – buildings, foundations and services (on-site and off-site).	Exposure to explosive gases.	N/A	N/A	N/A
	Ecological/geological designations.	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

Assumes remediation required has been undertaken and construction works are complete.

N/A is not applicable, due to grouping assumption that Group B sites are not affected by ground gas.

'On-site users' excludes rail passengers (as whilst within trains, will at all routine times be within a controlled environment) and maintenance workers but includes people at stations/depots or in areas returned to public land after construction.

A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 11: Significance of impact during construction and post-construction for Group B sites

Contaminant linkage	**Baseline**	**Construction**	**Post-construction**	**Construction impact**	**Post-construction impact**
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Exposure to soil contamination – on-site users (residential)	Moderate/low risk	N/A	Very low risk to low risk	N/A	Minor beneficial to moderate beneficial
Exposure to groundwater contamination – on-site users (residential)	Moderate/low risk	N/A	Very low risk to low risk	N/A	Minor beneficial to moderate beneficial
Exposure to ground gas – on-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination – on-site users (commercial/public open space) (station rail users post-construction only)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial
Exposure to groundwater contamination – on-site users (commercial/public open space) (station rail users post-construction only)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial

Contaminant linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Exposure to ground gas – on-site users (commercial/public open space) (station rail users post-construction only)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination – off-site users (residential, schools)	Low risk	Low risk	Very low risk to low risk	Negligible	Negligible to minor beneficial
Exposure to groundwater contamination – off-site users (residential, schools)	Low risk	Low risk	Very low risk to low risk	Negligible	Negligible to minor beneficial
Exposure to ground gas – off-site users (residential, schools)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination – off-site users (commercial/public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (commercial/public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible

Contaminant linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Exposure to ground gas – off-site users (commercial/public open space)	N/A	N/A	N/A	N/A	N/A
Contaminated soil leachate/groundwater and pollution of aquifer	Moderate/low risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible to minor adverse	Minor beneficial to moderate beneficial
Contaminated soil leachate/groundwater and impact on surface watercourse	Moderate/low risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible to minor adverse	Minor beneficial to moderate beneficial
Impact on property receptors	N/A	N/A	N/A	N/A	N/A
Impact on ecological/ geological designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Negligible to minor adverse	Negligible to moderate beneficial
Notes / assumptions Assumes that remediation has been undertaken and construction works complete. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.					

Detailed risk assessment - Group C

Table 12: Detailed risk assessment for Group C sites in the study area

Site ID (IDS)	26-4, 26-13, 26-14, 26-18, 26-20, 26-31, 26-33, 26-46, 26-47, 26-50, 26-71, 26-82, 26-87, 26-139 and 26-229
Community forum area	Washwood Heath to Curzon Street
Site group	Group C: sites that fall outside of the land required to construct the Proposed Scheme affected by soil/groundwater contamination and ground gas
Site title (Site ID) and land use class[10]	Greenworks Training Academy/former pit (assumed infilled) (26-4), class 3 historical land use. Residential/infilled ground (26-13), class 3 historical land use. Residential; allotments/former Ward End Mill (Corn) and associated mill pond (assumed infilled); infilled ground (26-14), class 3 historical land use. Residential/former brickworks; infilled ground (26-18), class 3 historical land use. Carlsberg Tetley Brewing Ltd/infilled ground (26-20), class 3 historical land use. Gravelly Industrial Park (excluding printers)/infilled ground (26-31), class 3 historical land use. Costco Wholesale (UK) Ltd/former slag heap (assumed levelled) and gas works (26-33), class 3 historical land use. Public open space/former mill pond associated with Park Mills (Edge Tools) (assumed infilled) (26-46), class 3 historical land use. Metro Triangle/Mount Street Industrial Estate; Mount Street Business Park/former Sao Paulo Works (Aluminium Castings) including tank; mill pond associated with Park Mills (Edge Tools) (assumed infilled) (26-47), class 3 historical land use. Waste storage/scrap metal recycling facility/former mill pond associated with Park Mills (Edge Tools) (assumed infilled); tar works (26-50), class 3 historical land use. Smurfit Kappa (paper based packaging) including tanks/ former gas works; chemical works; quarry/pit/slag heaps (assumed infilled/levelled) (26-71), class 3 current and historical land use. Class 1 unit at Saltley Business Park/former reservoir (assumed infilled); worked ground (assumed infilled) (26-82), class 3 historical land use. Residential; public open space/former sand/gravel pits (assumed infilled); infilled ground (26-87), class 3 historical land use. Sports ground (tarmac)/former quarry/pit (assumed infilled - small (~30 m diameter) so class 2 assumed) (26-139), class 2 historical land use. Millennium Point/former brass and steel founders; printing factories; oil depot; worked ground (assumed infilled) (26-229), class 3 historical land use.

[10] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Receptors	
Sensitive land use e.g. housing, schools, parks, playgrounds (adjacent and/or <50m)	Housing (Washwood Heath, Ward End, Bromford, Nechells, and Birmingham city centre), hotel, college/university and public open space/parks.
Aquifer e.g. Secondary A or Principal	Superficial: Secondary A (Alluvium / River Terrace/Glacial Deposits). Bedrock: Principal (Bromsgrove Sandstone Formation) and Secondary B (Mercia Mudstone).
Surface watercourses (adjacent and/or <50 m)	River Tame, River Rea, and Grand Union Canal.
Geological or ecological designations e.g. SSSI or Ramsar	None
Property e.g. mineral resources, buildings and structures, Grade 1 agricultural land	No significant mineral resources. Residential and commercial buildings and infrastructure present throughout. Buildings and structures (potentially affected by gas).
Post-construction development	
None. Sites are located outside of the land required to construct the Proposed Scheme.	

Table 13: Baseline CSM and qualitative risk assessment for Group C sites

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Low	Medium	Moderate/low risk
	On-site users – commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Low	Minor	Low risk
	Off-site users - residential, college and university	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Low	Minor	Low risk
	Off-site users – commercial, public open space.	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Low	Minor	Low risk
	Controlled waters – groundwater (Principal and Secondary A Aquifer).	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface water (River Tame, River Rea, and Grand Union Canal).	Groundwater migration, direct run-off from site.	Low	Medium	Moderate/low risk
	Property receptors – buildings, foundations and services (on-site and off-site).	Exposure to explosive gases.	Low	Medium	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Ecological/geological designations.	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

Sites assessed without construction of the Proposed Scheme.

N/A is not applicable as there are no ecological / geological designations in this study area.

'On-site' and 'off-site' here refer to site users being situated within or adjacent to the potentially contaminated sites being assessed.

Table 14: Construction CSM and qualitative risk assessment for Group C sites

Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk with construction stage mitigation**
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Low	Medium	Moderate/low risk
	On-site users –commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Low	Minor to medium	Low risk to moderate/low risk
	Off-site users – residential, college and university	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Low	Minor to medium	Low risk to moderate/low risk
	Off-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Low	Minor to medium	Low risk to moderate/low risk
	Controlled waters – groundwater (Principal and Secondary A Aquifer)	Vertical and lateral migration.	Low	Medium to severe	Moderate/low risk to moderate risk
	Controlled waters – surface water (River Tame, River Rea, and Grand Union Canal)	Groundwater migration, direct run-off from site.	Low	Medium to severe	Moderate/low risk to moderate risk
	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	Low	Medium to severe	Moderate/low risk to moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	Ecological/geological designations.	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions During construction standard mitigation procedures are assumed to be implemented in accordance with the CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management. 'On-site' and 'off-site' here refer to site users being situated within or adjacent to the potentially contaminated sites being assessed. Sites within this CSM group are located outside of the land required to construct the Proposed Scheme and represent off-site potential sources of contamination. Due to the absence of remediation targeting these sites, the source at construction will remain the same as at baseline. Whilst the CoCP will make it unlikely that there will be adverse consequences, it is considered that there may be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.					

Table 15: Post-construction CSM and qualitative risk assessment for Group C sites

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Low	Medium	Moderate/low risk
	On-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Low	Minor	Low risk
	Off-site users – residential, college and university	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Low	Minor	Low risk
	Off-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Low	Minor	Low risk
	Controlled waters – groundwater (Principal and Secondary A Aquifer)	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface water (River Tame, River Rea, and Grand Union Canal)	Groundwater migration, direct run-off from site.	Low	Medium	Moderate/low risk
	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	Low	Medium	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions 'On-site' and 'off-site' here refer to site users being situated within or adjacent to the potentially contaminated sites being assessed. Sites within this CSM group are located outside of the land required to construct the Proposed Scheme and represent off-site potential sources of contamination. Due to the absence of remediation targeting these sites, the source at post-construction will remain the same as at baseline.					

Table 16: Significance of impact during construction and post-construction for Group C sites

Contaminant Linkage	**Baseline**	**Construction**	**Post-construction**	**Construction impact**	**Post-construction impact**
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Exposure to soil contamination – on-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Negligible	Negligible
Exposure to groundwater contamination – on-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Negligible	Negligible
Exposure to ground gas – on-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Negligible	Negligible
Exposure to soil contamination – on-site users (commercial, public open space)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to groundwater contamination – on-site users (commercial, public open space)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to ground gas – on-site users (commercial, public open space)	Low risk	Low risk to moderate/low risk	Low risk	Negligible to minor adverse	Negligible

Contaminant Linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Exposure to soil contamination – off-site users (residential, college and university)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (residential, college, and university)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to ground gas – off-site users (residential, college and university)	Low risk	Low risk to moderate/low risk	Low risk	Negligible to minor adverse	Negligible
Exposure to soil contamination – off-site users (commercial, public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (commercial, public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to ground gas – off-site users (commercial, public open space)	Low risk	Low risk to moderate/low risk	Low risk	Negligible to minor adverse	Negligible

Contaminant Linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Contaminated soil leachate/groundwater and pollution of aquifer	Moderate/low risk	Moderate/low risk to moderate risk	Moderate/low risk	Negligible to minor adverse	Negligible
Contaminated soil leachate/groundwater and impact on surface watercourse	Moderate/low risk	Moderate/low risk to moderate risk	Moderate/low risk	Negligible to minor adverse	Negligible
Impact on property receptors	Moderate/low risk	Moderate/low risk to moderate risk	Moderate/low risk	Negligible to minor adverse	Negligible
Impact on ecological/ geological designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Negligible to minor adverse	Negligible
Notes / assumptions A range is in places given as whilst the CoCP will make it unlikely that there will be adverse consequences; it is considered that there may be temporary minor adverse effects during the construction period from ground disturbance. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.					

Detailed risk assessment - Group D

Table 17: Detailed risk assessment for Group D sites in the study area

Site ID (IDS)	26-10, 26-17, 26-19, 26-28, 26-29, 26-38, 26-40, 26-43, 26-54, 26-58, 26-60, 26-64, 26-78, 26-88, 26-90, 26-109, 26-126, 26-127, 26-128, 26-129, 26-142, 26-151, 26-203, 26-205, 26-247, 26-248, 26-249, 26-259, 26-265, 26-268, 26-304, 26-321, 26-322, 26-323, 26-326, 26-330, 26-334, 26-337, 26-338, 26-340, 26-341, 26-342, 26-346, 26-347, 26-349, 26-350, 26-365, 26-367, 26-373, 26-375, 26-378, 26-381, 26-385, 26-391 and 26-405
Community forum area	Washwood Heath to Curzon Street
Site group	Group D: sites which fall outside of the land required to construct the Proposed Scheme affected by soil/groundwater contamination only
Site title (Site ID) and land use class[11]	Various small industrial/commercial units including Ash Heat Treatments Ltd/former light engineering works (26-10), class 2 current and historical land use. Unspecified motor garage (26-17), class 2 historical land use. Undeveloped land; roads/former sewage works (26-19), class 2 historical land use. TOTAL Washwood Heath (fuel station entry) open (26-28), class 3 current land use. Residential/former Warrenhouse Farm (26-29), class 1 historical land use. Birmingham Autogas/likely former sewage works; Nechells Power Station; electricity works (26-38), class 3 current land use. Unspecified building and containers/former sewerage farm; Nechells Power Station (including tank); electricity works (26-40), class 3 historical land use. Various class 1 units/uses/former possible tank; gas works (26-43), class 3 historical land use. Valspar (coatings manufacturers); unspecified warehouses (likely associated with Valspar)/former Celamel Works (paint and varnish); works (26-54), class 3 current and historical land use. Mount Street Business Centre (printers only) (26-58), class 3 current land use. Roy S.Ely Transport Ltd (haulage); Hawkeswood Metal Recycling Limited/former works; likely class 2 use (26-60), class 2 current and historical land use. Class 2 units at Saltley Business Park/former Saltley Works (Railway Carriage and Wagon) (26-64), class 2 current and historical land use. Unspecified unit at Saltley Business Park (assumed class 1)/ former Saltley Works (Railway Carriage and Wagon) (26-78), class 2 historical land use. JET Saltley Gate Service Station (fuel station entry) (open) (26-88), class 3 current land use.

[11] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[12]	Various class 2 industrial units/uses (26-90), class 2 current land use. Mainstream Industrial Park (printers only)/ former gas works (26-109), class 3 current and historical land use. Greggs Plc (bakery)/former gas works (26-126), class 3 historical land use. Various class 1 units/uses/former gas works (26-127), class 3 historical land use. Thrifty Car and Van Rental/former gas works (26-128), class 3 historical land use. Various class 2 industrial units/uses/former gas works (26-129), class 3 historical land use. AK Motor Salvage (scrapyard) (26-142), class 2 current land use. Cornwall Industrial Estate (printers only)/former mills (26-151), class 3 current land use. Residential/former cavalry/artillery barracks (26-203), class 2 historical land use. Former office building (currently vacant); depot; Midlands Co-operative Society Ltd/former engineering works; depot (26-205), class 2 current and historical land use. Wheels Service Station (fuel station entry) (obsolete)/ former engineering works; depot (26-247), class 3 current land use. Various commercial/industrial units/uses including an unknown unit/workshops (assumed class 2)/former malthouse (26-248), class 2 current land use. Star Hand Car Wash; garage; Bordesley SS (fuel station entry) (obsolete)/former garage; works (26-249), class 3 current land use. Commercial; retail; offices/disused tank (removed) (26-259), class 3 historical land use. Croy Glass Fibre Products; hand car wash; depot/former rubber works; depot (26-265), class 2 current and historical land use. BP Waterlinks Connect (fuel station entry) (open); garage (26-268), class 3 current land use. Apparently unused industrial building; warehouse / former metal works (26-304), class 3 historical land use. Various class 2 industrial units/uses / former mineral water works (26-321), class 2 current and historical land use. Whittaker Fleet Care Ltd (fuel station entry) (non-retail)/ disused tank (slurry filled) (26-322), class 3 current and historical land use. Warehouse (apparently vacant) former Attenborough and Peacock (Birmingham) Ltd (iron/steel manufacture)/ former Viaduct Works (safe, iron door) (26-323), class 3 current and historical land use. Latifs Wholesaler (including tank)/former Solar Works (chandelier and gas fitting) (26-326), class 3 current land use. Various class 2 industrial units/uses/former metal works; printing works; disused tank (slurry filled) (26-330), class 3 historical land use.

[12] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[13]	Car park and electricity sub-station/former Viaduct Works (safe, iron door) (26-334), class 3 historical land use. Class 2 industrial units/uses at Oxford Trading Estate/ former metal works (26-337), class 3 historical land use. The Smithfield Garage Ltd (apparently inactive); warehouse; car park; South Birmingham College/former Phoenix Works (iron); disused tank (slurry filled) (26-338), class 3 historical land use. Birmingham Dogs Home/former engineering works (26-340), class 2 historical land use. Premier Plating Jigs (designers and manufacturers to the metal finishing trade)/former metal works (26-341), class 3 historical land use. Wholesalers (general) from factory type buildings/former radiator works (26-342), class 2 current and historical land use. Mission Fabric Printers/former garage (26-346), class 3 current land use. MOT/vehicle repair garage/former garage (26-347), class 2 current and historical land use. Vacant brownfield land in an area of industrial land use/ former New Mill Works (26-349), class 2 current and historical land use. Ventilation contractors compound (air flow engineers)/ former chemical works (26-350), class 3 historical land use. Commercial; retail; offices/former printing works (26-365), class 3 historical land use. Commercial; retail; offices/former chemical works (26-367), class 3 historical land use. Moor Street Queensway; commercial; retail; offices/ former warehouse (26-373), class 1 historical land use. Moor Street; Park Street; commercial; retail; offices/ disused tank (foam filled) (26-375), class 3 historical land use. Moor Street Queensway; commercial; retail; offices/ former printing works (26-378), class 3 historical land use. Commercial; retail; offices/former engineering works (26-381), class 2 historical land use. Undeveloped land/former depot (26-385), class 2 historical land use. Commercial; retail; offices/former printing works (26-391), class 3 historical land use. National Grid storage yard (26-405), class 3 current land use.
Receptors	
Sensitive land use e.g. housing, schools, parks, playgrounds (adjacent and/or <50m)	Housing (Washwood Heath, Nechells and Birmingham city centre), hotel, school/college, and public open space/parks. Commercial areas.

[13] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Aquifer e.g. Secondary A or Principal	Superficial: Secondary A (Alluvium/River Terrace/Glacial Deposits). Bedrock: Principal (Bromsgrove Sandstone Formation) and Secondary B (Mercia Mudstone).
Surface watercourses (adjacent and/or <50 m)	River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal and Digbeth Branch Canal.
Geological or ecological designations e.g. SSSI or Ramsar	None
Property e.g. mineral resources, buildings and structures, Grade 1 agricultural land	No significant mineral resources. Residential and commercial buildings and infrastructure present throughout.
Post-construction development	
None. Sites are located outside of the land required to construct the Proposed Scheme.	

Table 18: Baseline CSM and qualitative risk assessment for Group D sites

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users – commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential, school/college	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	Off-site users – residential, school/college	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater (Principal and Secondary A aquifer)	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface water (River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal and Digbeth Branch Canal)	Groundwater migration, direct run-off from site.	Low	Medium	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	N/A	N/A	N/A
	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions Sites assessed without construction of the Proposed Scheme. N/A is not applicable, due to grouping assumption that Group D sites are not affected by ground gas or as there are no ecological/geological designations in this study area. 'On-site' and 'off-site' here refer to site users being situated within or adjacent to the potentially contaminated sites being assessed.					

Table 19: Construction CSM and qualitative risk assessment for Group D sites

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users – commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential, school/college	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	Off-site users – residential, school/college	Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater (Principal and Secondary A aquifer)	Vertical and lateral migration.	Low	Medium to severe	Moderate/low risk to moderate risk
	Controlled waters – surface water (River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal and Digbeth Branch Canal)	Groundwater migration, direct run-off from site.	Low	Medium to severe	Moderate/low risk to moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, and PCB.	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	N/A	N/A	N/A
	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

During construction standard mitigation procedures are assumed to be implemented in accordance with the CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management.

N/A is not applicable, due to grouping assumption that Group D sites are not affected by ground gas.

'On-site' and 'off-site' here refer to site users being situated within or adjacent to the potentially contaminated sites being assessed.

Sites within this CSM group are located outside of the land required to construct the Proposed Scheme and represent off-site potential sources of contamination. Due to the absence of remediation targeting these sites, the source at construction will remain the same as at baseline.

Whilst the CoCP will make it unlikely that there will be adverse consequences, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.

Table 20: Post-construction CSM and qualitative risk assessment for Group D sites

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate and groundwater contamination.	On-site users - residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users -commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - residential, school/college	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate and groundwater contamination.	Off-site users - residential, school/college	Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of dusts with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater (Principal and Secondary A aquifer)	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface water (River Tame, River Rea, River Rea Overflow Channel, Grand Union Canal and Digbeth Branch Canal)	Groundwater migration, direct run-off from site.	Low	Medium	Moderate/low risk
Residual soil, leachate and groundwater contamination.	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

'On-site' and 'off-site' here refer to site users being situated within or adjacent to the potentially contaminated sites being assessed.

N/A is not applicable, due to grouping assumption that Group D sites are not affected by ground gas.

Sites within this CSM group are located outside of the land required to construct the Proposed Scheme and represent off-site potential sources of contamination. Due to the absence of remediation targeting these sites, the source at post-construction will remain the same as at baseline.

Table 21: Significance of impact during construction and post-construction for Group D sites

Contaminant linkage	**Baseline**	**Construction**	**Post-construction**	**Construction impact**	**Post-construction impact**
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Exposure to soil contamination – on-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Negligible	Negligible
Exposure to groundwater contamination – on-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Negligible	Negligible
Exposure to ground gas – on-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination – on-site users (commercial)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to groundwater contamination – on-site users (commercial)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to ground gas – on-site users (commercial)	N/A	N/A	N/A	N/A	N/A

Contaminant linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Exposure to soil contamination – off-site users (residential, school/college)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (residential, school/college)	Low risk	Low risk	Low risk	Negligible	Negligible
Exposure to ground gas – off-site users (residential, school/college)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination – off-site users (commercial, public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (commercial, public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to ground gas – off-site users (commercial, public open space)	N/A	N/A	N/A	N/A	N/A

Contaminant linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Contaminated soil leachate/groundwater and pollution of aquifer	Moderate/low risk	Moderate/low risk to moderate risk	Moderate/low risk	Negligible to minor adverse	Negligible
Contaminated soil leachate/groundwater and impact on surface watercourse	Moderate/low risk	Moderate/low risk to moderate risk	Moderate/low risk	Negligible to minor adverse	Negligible
Impact on property receptors	N/A	N/A	N/A	N/A	N/A
Impact on ecological/ geological designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Negligible to minor adverse	Negligible
Notes / assumptions A range is in places given as whilst the CoCP will make it unlikely that there will be adverse consequences, it is considered that there may be temporary minor adverse effects during the construction period from ground disturbance. Mitigation measures over and above the CoCP are detailed in the Volume 2: CFA26 report for this study area.					

Detailed risk assessment - The Washwood Heath depot and Bromford tunnel west portal/approach

Table 22: Detailed risk assessment for the Washwood Heath Depot and Bromford tunnel west portal/approach

Site ID (IDS)	26-11, 26-12, 26-18, 26-22 and 26-36 (within construction boundary) 26-1, 26-6, 26-7, 26-10, 26-13, 26-14, 26-29, 26-35, 26-45 and 26-53 (outside of construction boundary)
Community forum area	Washwood Heath to Curzon Street
Site group	Site/area specific: Washwood Heath depot and Bromford tunnel west portal/approach.
Site title (Site ID) and land use class[14]	Within construction boundary: UK Mail depot including fuel filling area/former refuse heaps/gravel pits (assumed infilled/levelled); historical landfill ("Land Rear of Freight Rover Works") (26-11), class 3 current and historical land use. Derelict land (former LDV site)/former refuse heaps/gravel pits (assumed infilled/levelled); historical landfill ("Land Rear of Freight Rover Works") (26-12), class 3 historical land use. Residential/former brickworks; infilled ground (26-18), class 3 historical land use. Former Alstom works site/former Midland Railway Carriage and Wagon Works - including tanks and mounds/pits (assumed levelled/infilled); infilled and worked ground (26-22), class 3 current and historical land use. Various class 2 industrial units/uses including Cemex UK Materials Ltd (including various tanks)/infilled ground (26-36), class 3 current and historical land use. Outside of construction boundary: Railway land use (CFA26) (26-1), class 2 current and historical land use. Unspecified yard/vehicle storage / former refuse heap (assumed infilled/levelled) (26-6), class 3 historical land use. Various class 2 industrial units/uses / former refuse heap (assumed infilled/levelled) (26-7), class 3 historical land use. Various small industrial/commercial units including Ash Heat Treatments Ltd / former light engineering works (26-10), class 2 current and historical land use.

[14] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Site title (Site ID) and land use class[15]	Residential / infilled ground (26-13), class 3 historical land use. Residential; allotments / former Wardend Mill (Corn) and associated mill pond (assumed infilled); infilled ground (26-14), class 3 historical land use. Residential / former Warrenhouse Farm (26-29), class 1 historical land use. Vauxhall Lookers Garage / former disturbed ground/pit (assumed infilled); gas works (26-35), class 3 historical land use. Gas works / former disturbed ground/pit (assumed infilled); gas works (26-45), class 3 current and historical land use. H W Taroni Metals Ltd (scrap metal); Aston Sheds/car wash / former railway land use and likely class 2 use (26-53), class 2 current and historical land use.
Receptors	
Sensitive land use e.g. housing, schools, parks, playgrounds (adjacent and/or <50m)	Housing (Washwood Heath, Ward End and Bromford), Leigh Junior, Infant and Nursery School and public open space/parks. Commercial areas.
Aquifer e.g. Secondary A or Principal	Superficial: Secondary A (Alluvium/River Terrace/Glacial Deposits) Bedrock: Secondary B (Mercia Mudstone)
Surface watercourses (adjacent and/or <50 m)	River Tame, drain, Washwood Heath Brook, boating lake and River Rea Overflow Channel.
Geological or ecological designations e.g. SSSI or Ramsar	None
Property e.g. mineral resources, buildings and structures, Grade 1 agricultural land	No significant mineral resources. Residential and commercial buildings and infrastructure present throughout. Buildings and structures (potentially affected by gas).
Other	Washwood Heath depot workers
Post-construction development	
Washwood Heath depot, Bromford tunnel west portal and egress through retained cut.	

[15] As defined by Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2)

Table 23: Baseline CSM and qualitative risk assessment for the Washwood Heath Depot and Bromford tunnel west portal/approach

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Low	Medium	Moderate/low risk
	On-site users - commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Unlikely	Medium	Low risk
	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Unlikely	Medium	Low risk
	Off-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Unlikely	Medium	Low risk
	Controlled waters – groundwater (Secondary A aquifer)	Vertical and lateral migration.	Low to likely	Medium	Moderate/low risk to moderate risk
	Controlled waters – surface waters (River Tame, drain, Washwood Heath Brook, boating lake and River Rea Overflow Channel)	Groundwater migration, direct run-off from site.	Low to likely	Medium	Moderate/low risk to moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	Low	Medium	Moderate/low risk
	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions Sites assessed without construction of the Proposed Scheme. 'On-site users' refers to current site users of areas within the land required to construct the Proposed Scheme.					

Table 24: Construction CSM and qualitative risk assessment for the Washwood Heath Depot and Bromford tunnel west portal/approach

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users - commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low risk
		Inhalation of ground gases.	Unlikely	Medium to severe	Low risk to moderate/low risk
	Off-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low risk
		Inhalation of ground gases.	Unlikely	Medium to severe	Low risk to moderate/low risk
	Controlled waters – groundwater (Secondary A aquifer)	Vertical and lateral migration.	Low	Medium to severe	Moderate/low risk to moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, ammonia, acids, organic compounds, inorganic compounds, asbestos, hydrocarbons, PAH, solvents, lubricants, fuel oils, alkalis, PCB, methane and carbon dioxide.	Controlled waters – surface waters (River Tame, drain, Washwood Heath Brook, boating lake and overflow channel to River Rea)	Groundwater migration, direct run-off from site.	Low	Medium to severe	Moderate/low risk to moderate risk
	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	Low	Medium to severe	Moderate/low risk to moderate risk
	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

'On-site users' refers to current site users of areas within the land required to construct the Proposed Scheme.

N/A is not applicable, as on-site users have been removed from the construction stage CSM as they will not be present during construction.

During construction standard mitigation procedures are assumed to be implemented in accordance with the CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management.

Whilst the CoCP will make it unlikely that there will be adverse consequences, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.

Ground investigation will be required prior to and during construction.

Assumes construction phase includes remediation that may be required.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Where there are sites that are known to be contaminated and where an existing impact on groundwater quality is likely at baseline, construction is considered unlikely to worsen the situation with regards to groundwater and surface water quality.					

Table 25: Post-construction CSM and qualitative risk assessment for the Washwood Heath Depot and Bromford tunnel west portal/approach

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.	On-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users - commercial, depot maintenance workers	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low risk to low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low risk to low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to medium	Very low risk to low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to medium	Very low risk to low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	Off-site users – commercial, public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Negligible to minor	Very low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Negligible to minor	Very low risk
		Inhalation of ground gases.	Unlikely	Negligible to medium	Very low risk to low risk
	Controlled waters – groundwater (Secondary A aquifer)	Vertical and lateral migration.	Unlikely	Negligible to medium	Very low risk to low risk
	Controlled waters – surface waters (River Tame, drain, Washwood Heath Brook, boating lake and overflow channel to River Rea)	Groundwater migration, direct run-off from site.	Unlikely	Negligible to medium	Very low risk to low risk
	Property receptors – buildings, foundations and services (on-site and off-site)	Exposure to explosive gases.	Unlikely	Negligible to medium	Very low risk to low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual soil, leachate, and groundwater contamination. Ground gas.	Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions 'On-site users' refers to current site users of areas within the land required to construct the Proposed Scheme. It excludes rail passengers (as whilst within trains, will at all routine times be within a controlled environment) and maintenance workers but includes those at stations/depots or in areas returned to public land after construction. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.					

Table 26: Significance of impact during construction and post-construction for the for Washwood Heath depot and Bromford tunnel west portal/approach

Contaminant Linkage	**Baseline**	**Construction**	**Post-construction**	**Construction impact**	**Post-construction impact**
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Exposure to soil contamination – on-site users (residential)	Moderate/low risk	N/A	N/A	N/A	N/A
Exposure to groundwater contamination – on-site users (residential)	Moderate/low risk	N/A	N/A	N/A	N/A
Exposure to ground gas – on-site users (residential)	Moderate/low risk	N/A	N/A	N/A	N/A
Exposure to soil contamination – on-site users (commercial)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial
Exposure to groundwater contamination – on-site users (commercial)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial
Exposure to ground gas – on-site users (commercial)	Low risk	N/A	Very low risk to low risk	N/A	Negligible to minor beneficial

Contaminant Linkage	Baseline	Construction	Post-construction	Construction impact	Post-construction impact
	Risk	Risk	Risk	Significance	Significance
Exposure to soil contamination – off-site users (residential	Low risk	Low risk	Very low risk to low risk	Negligible	Negligible to minor beneficial
Exposure to groundwater contamination – off-site users (residential)	Low risk	Low risk	Very low risk to low risk	Negligible	Negligible to minor beneficial
Exposure to ground gas – off-site users (residential)	Low risk	Low risk to moderate/low risk	Very low risk to low risk	Negligible to minor adverse	Negligible to minor beneficial
Exposure to soil contamination – off-site users (commercial, public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to groundwater contamination – off-site users (commercial, public open space)	Very low risk	Very low risk	Very low risk	Negligible	Negligible
Exposure to ground gas – off-site users (commercial, public open space)	Low risk	Low risk to moderate/low risk	Very low risk to low risk	Negligible to minor adverse	Negligible to minor beneficial

Contaminant Linkage	**Baseline**	**Construction**	**Post-construction**	**Construction impact**	**Post-construction impact**
	Risk	**Risk**	**Risk**	**Significance**	**Significance**
Contaminated soil leachate/groundwater and pollution of aquifer	Moderate/low risk to 4 (moderate risk(	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible	Minor beneficial to moderate beneficial
Contaminated soil leachate/groundwater and impact on surface watercourse	Moderate/low risk to moderate risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible	Minor beneficial to moderate beneficial
Impact on property receptors	Moderate/low risk	Moderate/low risk to moderate risk	Very low risk to low risk	Negligible to minor adverse	Minor beneficial to moderate beneficial
Impact on ecological/ geological designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Negligible to minor adverse	Negligible to moderate beneficial
Notes / assumptions A range is in places given as whilst the CoCP will make it unlikely that there will be adverse consequences; it is considered that there may be temporary minor adverse effects during the construction period from ground disturbance. Mitigation measures over and above the CoCP are detailed in the Volume 2 report for this study area.					

4 Inspections notes and other site data

4.1.1 This section presents the following data:

- site inspection notes for those key potentially contaminated sites visited during the study period;
- names of ground investigation or contamination survey reports reviewed during the study period; and
- any other relevant site data.

4.1.2 Table 27 details the site inspection notes from visits made to sites. The site inspection notes are appended to this report.

Table 27: Site inspection notes

Date	Site	No. pages
21 August 2012	Unit 5, Wolseley Drive, B8 2SQ	7
4 September 2012	3 Gate Street, B8 1JE	4
30 April 2013	Various Former Industry (BCC Land Ownership)	7
30 April 2013	Former Aston Church Trading Estate and Carriage Works (BCC Land Ownership)	7
30 April 2013	Former Gas Works (Saltley) (BCC Land Ownership)	6
30 April 2013	Eastside Locks (BCC Land Ownership)	6
30 April 2013	UK Mail, Wolseley Drive	7
10 July 2013	Cemex UK (Sleeper Plant), Aston Church Road, Birmingham, B8 1QF	7
10 July 2013	Cemex UK (Asphalt Plant), Aston Church Road, Birmingham, B8 1QF	7

4.1.3 Other relevant site data that has been reviewed is detailed in Table 28. Report review summaries of these documents are appended to this report.

Table 28: Other relevant site data

Site	Document description	No. pages of report review appended
Drews Lane, Washwood Heath, Birmingham	Phase II Environmental Site Investigation LDV, Drews Lane, Washwood Heath, Birmingham	1
Heartlands Central, Washwood Heath	Site Investigation Report Business Post, Heartlands Central, Washwood Heath	1
Former LDV, Birmingham	Factual Report Phase 2 Site Assessment LDV Ltd, Wolseley Drive, Washwood Heath, Birmingham. Prepared for LDV Ltd & AXA Real Estate Investment Managers Ltd.	1
LDV Heartlands Central, Birmingham	Report on Phase II Ground Investigation Work Carried Out At LDV Heartlands Central, Birmingham	2

LDV Heartlands Central, Birmingham	Report on Ground Investigation Work Carried Out At LDV Heartlands Central, Birmingham	1
LDV Heartlands Central, Birmingham	Rachael Cristy Environmental Services Department Gas Monitoring Data Heartlands Central	1
LDV Heartlands Central, Birmingham	LDV Heartlands Central, Birmingham Site Remediation Method Statement	1
LDV Heartlands Central, Birmingham	Site Investigation Report; Business Post; Heartlands Central; Washwood Heath; Birmingham	1
LDV Heartlands Central, Birmingham	Method Statement and Outline Specification for the Removal of Contaminants at the LDV Heartlands Redevelopment Site Birmingham	1
Heartlands Spine Road, Saltley Reservoir, Aston Church Lane	Folder on Saltley Reservoir, Aston Church Lane	1
Heartlands LDV, Birmingham	Heartlands LDV Remediation Pilot Scheme Prepared for Farebrother and Partners	1
Heartlands LDV, Birmingham	Heartlands Central, Birmingham (Letters)	1
Heartlands LDV, Birmingham	Heartlands Central, LDV Site (Letters)	1
Industrial Site Washwood Heath Environmental Audit Desk study Assessment	Industrial Site Washwood Heath Environmental Audit Desk study Assessment	1
Heartlands LDV, Birmingham	Heartlands Central, Land Quality Statement	1
Heartlands LDV, Birmingham	Heartlands Central, Remediation (Letters)	1
Plot 2, The LDV Site, Birmingham	Geo-Environmental Ground Investigation Factual and Interpretative Report: Plot 2, The LDV Site, Wolseley Drive, Washwood Heath, Birmingham	2
The LDV Site, Birmingham	Geo-Environmental Ground Investigation Interpretative Report: The LDV Site, Wolseley Drive, Washwood Heath, Birmingham	1
The LDV Site, Birmingham	Quantitative Risk Assessment Report: The LDV Site, Wolseley Drive, Washwood Heath, Birmingham	2
UK Mail Site, Birmingham	Desk Study Report: Wolseley Drive, Heartlands, Birmingham (Proposed Warehouse Extension): Parts A – D	1
Quantitative Risk Assessment Report Update (Letter Report)	Quantitative Risk Assessment Report Update (Letter Report)	1
Crawford Street, Saltley	Ashted Centre, Trial Pit Logs	1
British Gas, Saltley	Ground Investigation at British Gas	1
British Gas, Crawford Street	Contamination Investigation, Factual Report on Site Investigation	1
British Gas, Crawford Street	Qualitative Risk Assessment Along the Tow Path Adjacent to Crawford Street	1
British Gas, Crawford Street, Saltley	Site History, Geology, Contamination Report and Reclamation Strategy	2

British Gas, Crawford Street, Saltley	Reclamation of Saltley Gas Works, Phase II, Final Report	1
British Gas, Duddeston Mill Road, Saltley	High' Priority Site Boundary Survey	1
British Gas, Crawford Street, Saltley	Site History, Geology, Contamination Report and Reclamation Strategy	2
British Gas, Crawford Street, Saltley	Final Report on the Off-Site Highway and Environmental Issues	1
British Gas, Crawford Street, Saltley	Reclamation of Saltley Gas Works	1
LDV Site, Wolseley Drive, Washwood Heath, Birmingham	LDV Site, Wolseley Drive, Washwood Heath, Birmingham: TPH Remediation Works Validation Report	2
Curzon Street	Royal College of Organists, Geo-Environmental Interpretative Report	1
Landor Street, Birmingham	Freightliner Depot, Further Site Investigation	2
Landor Street, Birmingham	Groundwater Remediation and Monitoring, Birmingham Freightliner Terminal	1
Eastside, Curzon Street, Birmingham	Factual and Interpretative Report on Ground Investigation	1
Near Adderley Road, Saltley	Contamination Investigation on Birmingham and Warwick Canal Towpath	1
Network Park (Old Saltley Gasworks), Birmingham	Various letter correspondence between BWB and BCC	2
Former Windsor Street Facility, Birmingham	Intrusive Investigation Works at Former Windsor Street Facility	2
Landor Street Extension (Saltley Depot)	European Metal Recycling Ltd. Landor Street Extension (Saltley Depot) Environmental Assessment Report (Ref. 71619 rev.1)	2
Landor Street Extension (Saltley Depot)	European Metal Recycling Ltd. Landor Street Extension (Saltley Depot) Environmental Assessment Report (Ref. 71619 rev.1)	2
Landor Street Extension (Saltley Depot)	Factual Report Contaminated Land Investigation at Saltley Depot (Ref. 11461V.98/SAL/F)	1
Landor Street Extension (Saltley Depot), Birmingham	European Metal Recycling Ltd. Landor Street Extension (Saltley Depot), Birmingham Environmental Assessment Report (Ref. ME/06/6933 Rev 1). File provided also includes various letter and email correspondence.	2
Former Adderley Park Brick Works, Birmingham	Former Adderley Park Brick Works, Birmingham Land Quality Assessment (Project Ref. No. 5149)	2
Former Alstom Site, Washwood Heath, Birmingham	Phase 1 Geo-Environmental Audit at the Former Alstom Site, Washwood Heath, Birmingham	2
Hotel la Tour, Birmingham	Geoenvironmental Assessment, Hotel la Tour, Birmingham, Hotel la Tour (Birmingham) Ltd	2
Birmingham City University, City Centre Campus, Birmingham	Birmingham City University, City Centre Campus, Phase 2 Interpretive Ground Investigation Report	2

1A Bordesley Street, Digbeth, Birmingham	1A Bordesley Street, Digbeth, Ground and Boundary Walls Investigations Report	2
Proposed Hotel, Park Street/Bordesley Street, Birmingham	Fortmere Properties: Proposed Hotel, Park Street/Bordesley Street, Birmingham, Report on Ground Investigation (Report No J06185/01)	2
City Centre Campus, Eastside, Birmingham	Birmingham City University, City Centre Campus Phase 2, Geo-Environmental and Geotechnical Interpretative Report	2
City Centre Campus, Eastside, Birmingham	Birmingham City University, City Centre Campus Phase 2, Geo-Environmental and Geotechnical Desk Top Survey	2
Nechells Place, Birmingham	Nechells Place, Chemical assessment of earthworks materials	2
Nechells Place, Birmingham	Environmental Management Plan, Gasholder Station, Nechells Place, Nechells, Birmingham	2
Nechells Place, Birmingham	Environmental Assessment Site Investigation Factual Report, Nechells Gas Holder Station (Mentor No. 006731)	2
Nechells Place, Birmingham	Close-out Report for Infilling of Gasholder Tanks GH5 & GH6 at Nechells, Birmingham	2
Nechells Place, Birmingham	Land Remediation Programme 2003, Nechells Holder Station, Birmingham, Environmental Improvement Works, Validation Report, Volumes 1 – 3 (Mentor No. 006731)	2
Beorma Quarter, Digbeth	Environmental Statement – Beorma Quarter: Soils, Geology and Contamination (Ref: 67C12098)	2

5 Geological SSSI and local geological sites

5.1.1 This section presents the following data:

- citation data for geological SSSI;
- citation data for LGS, formerly called regionally important geological sites (RIGS); and
- any other relevant site data.

5.1.2 The remainder of this section is blank as there are no geological SSSI or LGS within the study area.

6 Mining and minerals data

6.1.1 This section presents the following data relating to mining and minerals information:

- details of planning data for minerals sites;
- lists of marl pits in each study area; and
- data from The Coal Authority.

6.1.2 The remainder of this section is blank as there is no mineral extraction or mining activity within the study area or designations for any future mining activity.

7 References

Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987.

Department for Environment, Food and Rural Affairs (DEFRA) and Environment Agency (2002), *Potential Contaminants for the Assessment of Land,* Environment Agency.

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	Unit 5, Wolseley Drive, B8 2SQ

PROJECT REFERENCE:	47062728	**DATE:**	21/08/2012

PREPARED BY:	Land quality project team	**NGR:**	-

WEATHER:	Cool breeze; dry; ~6/8 cloud cover

OVERVIEW SITE DESCRIPTION

CW Plant / tool hire. Former motorcycle/bus depot.

1) Provide a generalised description of the site and main activity

TOPOGRAPHY

Fairly level with localised slopes (e.g. to doorways).

Almost entirely hardstanding/building cover with only localised vegetation at boundaries. Hardstanding is average to good quality concrete.

Occasional litter (plastic, plastic bags, paper) especially near boundaries.

Occasional pot holes; trench scars; manhole covers. Various concrete blocks (road blocks) around perimeter.

1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover.
2) Look for evidence of Made Ground
3) Look for evidence of fly tipping
4) Gradient
5) Estimate percentage vegetation cover

SOIL QUALITY

None exposed. Only soil evident was that washed from jet wash in the north east corner of the site – appeared clean slightly gravelly sandy clay. Some litter; paper.

If exposed/present describe soil distribution and key characteristics including:
1) the presence of any odours;
2) coloured or oily deposits on the soil surface;
3) litter build up on soil surface;
4) absence of worm casts unless soil is naturally acidic;
5) soil structure etc.

SITE DRAINAGE

Surface drains – especially near to doorways. Standing water near fuelling tank in west (~3 x 2 m). Drain across centre of site (west – east). Appears to be of good integrity.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

Multi-coloured sheen on water near fuelling tank in the west.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

Unmanaged vegetation/ weeds at boundaries (localised).

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
   a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
   b) *Do trees appear stunted or diseased?*
   c) *Are there areas of poorly vegetated or bare patches of ground?*
   d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
   e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

Japanese knotweed on northern bank of River Tame to north (River Tame adjacent north of the site).

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

Main building (at central southern boundary) is one-storey, brick built with corrugated metal upper section and has a pitched roof.

A brick built car showroom building is present at the eastern boundary (one storey, except for the southern part which is two-storey).

Fragile roof noted on warning signs.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

Various tanks – including engine oil, anti-freeze, oil filters, brake fluid, compressed gas, contaminative waste, used plastic, used paint tins, gas oil; other vats (contents uncertain).

Staining around the base of the oil tanks adjacent east of the main building and at base of gate operation units.

Vats of tarmac noted (standing water inside).

Fuelling tanks – staining at the base and sheen on standing water at the base.

FloGas canisters (approximately 30 No.) in fenced area in the west.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

CW tool/plant hire. Former motorcycle/bus depot.

No known pollution incidents/pillages according to contact who provided escort around the site.

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION

Works to the south – sweet odour – phenols/aromatics?

Oily sheen on water near filling tank.

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION
Staining at base of oil tanks and gate operating box. Various tanks/bins/cylinders (content is uncertain in some cases).
1) State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials *2) Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE	
NORTH	Industry (beyond River Tame).
NORTHEAST	
EAST	Bromford Lane (residential land use beyond).
SOUTH EAST	
SOUTH	Ainscough Crane Hire Ltd.
SOUTHWEST	
WEST	Industry / car park.
NORTHWEST	
GENERAL	
1) Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination. *2) Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*	

MISCELLANEOUS COMMENTS/NOTES





Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



Photograph 7



Photograph 8

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	3 Gate Street, B8 1JE

PROJECT REFERENCE:	47062728	**DATE:**	04/09/2012

PREPARED BY:	Land quality project team	**NGR:**	-

WEATHER:	Overcast, slight breeze

OVERVIEW SITE DESCRIPTION
Storage sheds/garage and small parking areas.
1) Provide a generalised description of the site and main activity

TOPOGRAPHY
Level (very slight slope up to the east) Entirely hardstanding/building cover (approximately 60% building cover) – average quality concrete/tarmac.
1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover. *2) Look for evidence of Made Ground* *3) Look for evidence of fly tipping* *4) Gradient* *5) Estimate percentage vegetation cover*

SOIL QUALITY
N/A.
If exposed/present describe soil distribution and key characteristics including: *1) the presence of any odours;* *2) coloured or oily deposits on the soil surface;* *3) litter build up on soil surface;* *4) absence of worm casts unless soil is naturally acidic;* *5) soil structure etc.*

SITE DRAINAGE

N/A.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

N/A.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

N/A.

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

N/A.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

Single storey brick building; slightly sloping roof. Doors locked; building appears in disrepair with broken windows, broken drainpipe. Old sofas are located outside the building (possibly inside as well?). No contact could be made with the site contact and so full site access could not be granted. The site seemed unoccupied.

Single storey (slightly sloping roof) port-a-cabin – no access available.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

A brick wall (approximately 0.5 m in height) with a metal gate/fence on top (approximately 3 m overall) forms the western boundary onto Gate Street. Main gate provides access from road (padlocked) and to 'Gate Street Hostel' adjacent south.

Three or four 'Libra Furnishers' vans parked in concrete courtyard adjacent south of garage structure.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

Garages for storage (of furniture?).

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION

N/A.

1) *State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials*
2) *Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE

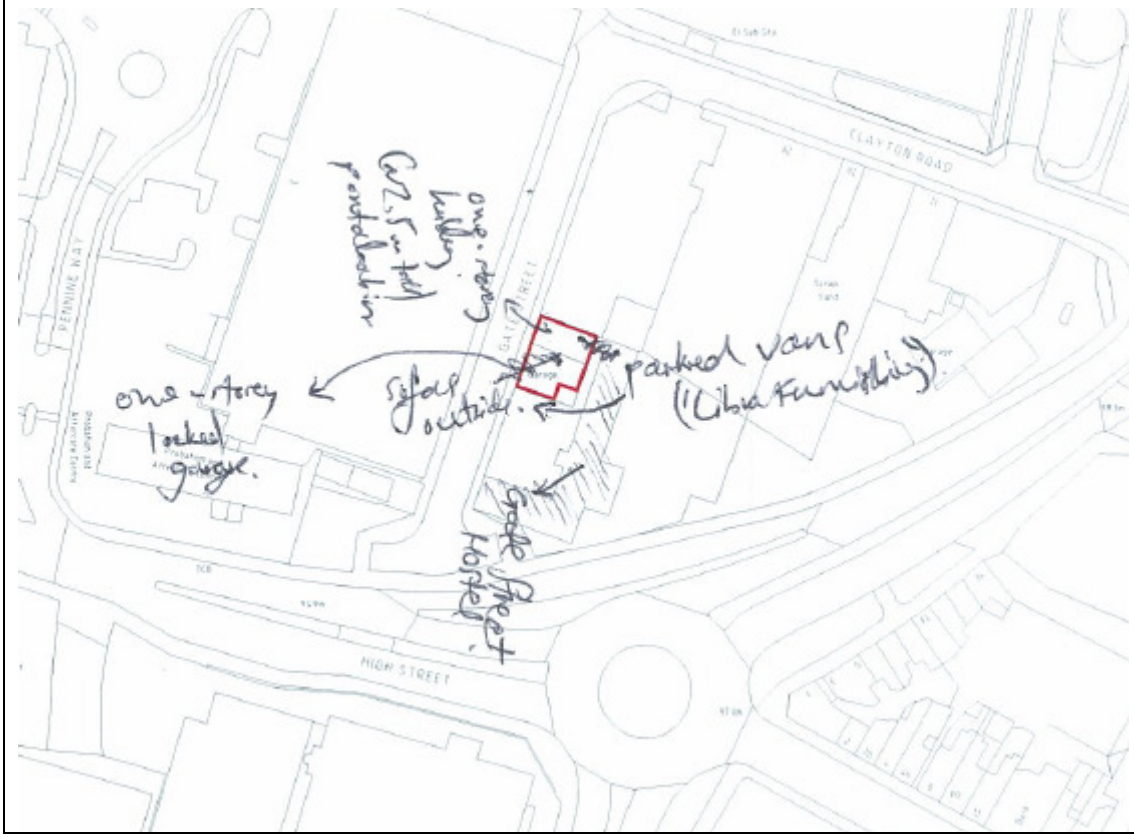
NORTH	Saltley Business Park.
NORTHEAST	
EAST	Saltley Business Park with residential land use beyond.
SOUTH EAST	
SOUTH	Commercial / industrial with residential land use beyond.
SOUTHWEST	
WEST	Saltley Business Park.

SURROUNDING LAND USE	
NORTHWEST	
GENERAL	

1) *Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.*
2) *Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*

MISCELLANEOUS COMMENTS/NOTES





GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	Various Former Industry (BCC Land Ownership)

PROJECT REFERENCE:	47062728	**DATE:**	30/04/2013

PREPARED BY:	Land quality project team	**NGR:**	409640 289135

WEATHER:	Dry; slight breeze

OVERVIEW SITE DESCRIPTION
Heartlands Parkway / undeveloped land / Grand Union Canal. Overgrown along all areas aside from roads. Access only available along canal.
1) Provide a generalised description of the site and main activity

TOPOGRAPHY
Appears level. Can only access along the canal – most of the area of BCC land is very overgrown and inaccessible.
1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover. *2) Look for evidence of Made Ground* *3) Look for evidence of fly tipping* *4) Gradient* *5) Estimate percentage vegetation cover*

SOIL QUALITY
Where accessible and present, soil appears clean. Made Ground likely to be present.
If exposed/present describe soil distribution and key characteristics including: *1) the presence of any odours;* *2) coloured or oily deposits on the soil surface;* *3) litter build up on soil surface;* *4) absence of worm casts unless soil is naturally acidic;* *5) soil structure etc.*

SITE DRAINAGE

None noted.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

Canal and ponds - no apparent sheens. Reeds appear healthy.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

Thick overgrown bushes/trees/grasses/nettles – appear healthy in general.

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

Lake/pond in the north west of the site – potential ecological significance but beyond the scope of the visit to assess this.

Reptile mats in the east.

Very overgrown.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

Pylon in centre of the site.

Heartlands Parkway dissects the site north to south.

Railway dissects the site east to west in the south.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

N/A.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

Former refuse destructor and various warehouses/works.

Currently undeveloped land / Heartlands Parkway / Grand Union Canal.

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION

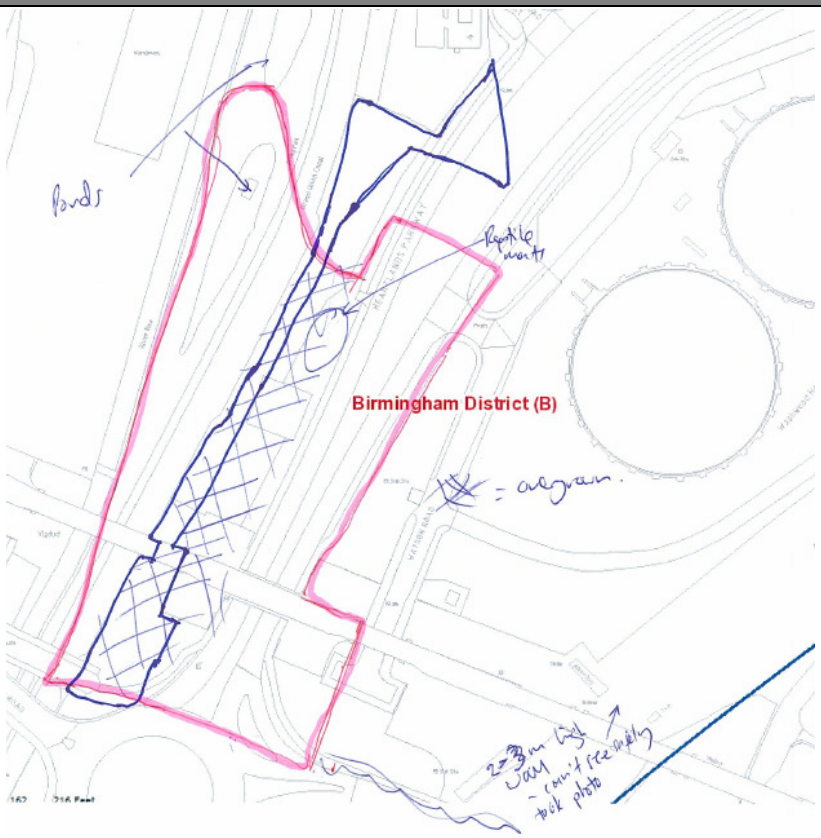
None noted.

1) *State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials*
2) *Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE	
NORTH	Various small industrial/commercial units.
NORTHEAST	Heartlands Parkway.
EAST	Gas works.
SOUTH EAST	Aston Church Road / railway.
SOUTH	Heartlands Parkway.
SOUTHWEST	Industry/commercial – Valspar
WEST	Residential with commercial beyond. Scrap metal recycling facility.
NORTHWEST	Scrap metal recycling facility.
GENERAL	

1) *Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.*
2) *Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*

MISCELLANEOUS COMMENTS/NOTES





Photograph 1 – Gas Works



Photograph 2 – Grand Union Canal



Photograph 3 – Grand Union Canal



Photograph 4 – Rail Overbridge



Photograph 5 – River Rea



Photograph 6 – Smurfit Kappa



Photograph 7 – View to Aston Church Road



Photograph 8 – View to BCC Land Ownership

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	Former Aston Church Trading Estate and Carriage Works (BCC Land Ownership)

PROJECT REFERENCE:	47062728	**DATE:**	30/04/2013

PREPARED BY:	Land quality project team	**NGR:**	409243 288357

WEATHER:	Dry; slight breeze; 7/8 cloud cover

OVERVIEW SITE DESCRIPTION

Heartlands Parkway (road), roundabout (partial). Flanked by vegetation, shrubs and small trees – largely inaccessible to west due to fencing and dense scrub. Former Aston Church Trading Estate.

Electricity Pylon between road and railway (east) on development plot (some 2 – 3 m lower than the road). Used as access track by Network Rail.

Grand Union Canal is on western boundary – overgrown between canal and road.

1) Provide a generalised description of the site and main activity

TOPOGRAPHY

Slight fall to south on road surface.

South east of roundabout falls away down c. 2m embankment to area of waste ground between railway and road.

Medium sized mound of soil at entrance to Network Rail access track, south of pylon.

Tarmac access track from Heartlands Parkway road south of Pylon.

1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover.
2) Look for evidence of Made Ground
3) Look for evidence of fly tipping
4) Gradient
5) Estimate percentage vegetation cover

SOIL QUALITY

Made Ground expected.

Area of burnt ground approximately 10 x 25 m in area.

If exposed/present describe soil distribution and key characteristics including:

1) *the presence of any odours;*
2) *coloured or oily deposits on the soil surface;*
3) *litter build up on soil surface;*
4) *absence of worm casts unless soil is naturally acidic;*
5) *soil structure etc.*

SITE DRAINAGE

No apparent issues. Road has surface drainage noted.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

N/A.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

On the flanks to the road and between railway and road– rough, unmanaged

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

None noted but not looked at in detail due to extent of cover/limited access.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

No buildings.

Electricity pylon between road and railway.

Access track (presumably for Network Rail).

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

Exposed sewer (i.e. no manhole cover) between road and railway in the area of burnt ground.

Electricity pylon.

Some railway sleeper and track sections stored on site.

Gas pipeline marker noted southeast of electricity pylon.

Probable River Rea culvert in south of site – surrounded by rusting railway track and electrical cables.

Grand Union Canal on western side of the site.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

Aston Church Trading estate historically.

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION

Area of burnt ground (approximately 25 x 10 m).

Some fly tipping.

Storage of railway sleeper and track sections.

Some abandoned pipework and cabling

Absence of vegetation to the south of the pylon – thought to be through vehicle wear rather than contamination.

Mound of soil south of the pylon:

- Mix of soil, concrete and ballast;
- Some metal debris;
- Old railway sleeper;
- Plastic and brick;
- Rounded fine to coarse quartzite gravel;
- Wood;
- Partially vegetated.

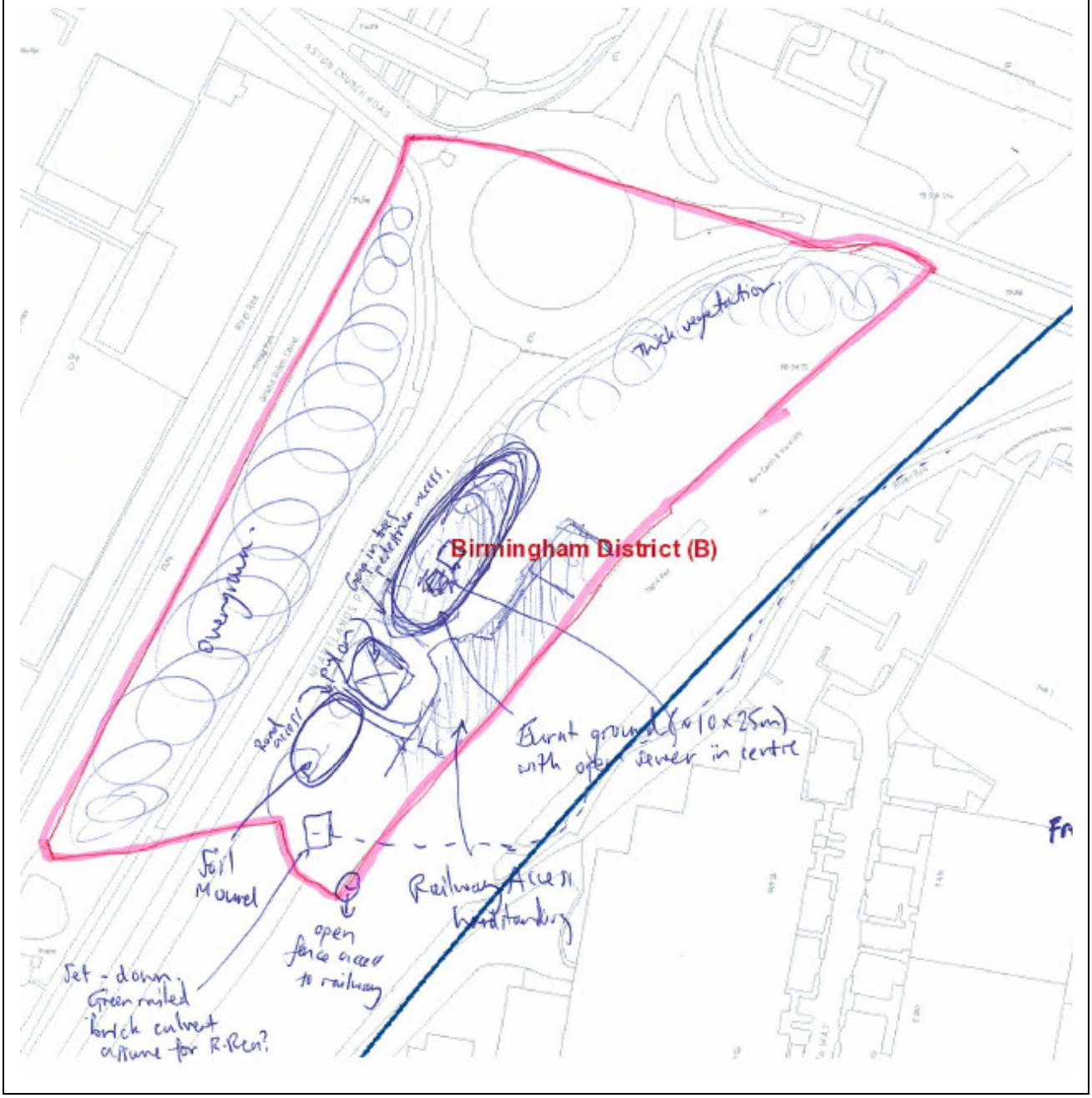
1) *State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials*
2) *Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE

NORTH	Road.
NORTHEAST	Gas works / railway.
EAST	Aston Church Road.
SOUTH EAST	Derelict land / railway.
SOUTH	Road (Heartlands Parkway).
SOUTHWEST	Hawkeswood Scrap Metal Processing
WEST	Aston Church Road.
NORTHWEST	Canal / River Rea.
GENERAL	

1) *Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.*
2) *Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*

MISCELLANEOUS COMMENTS/NOTES





Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



Photograph 7



Photograph 8

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	Former Gas Works (Saltley) (BCC Land Ownership)

PROJECT REFERENCE:	47062728	**DATE:**	30/04/2013

PREPARED BY:	Land quality project team	**NGR:**	409262 288400 409243 288357

WEATHER:	Dry; slight breeze; 7/8 cloud cover

OVERVIEW SITE DESCRIPTION
Heartlands Parkway / undeveloped land. Access only available from a viewpoint from Saltley viaduct. Focus placed on the central part of the site as this is suspected to have not been remediated and is a former gas works.
1) Provide a generalised description of the site and main activity

TOPOGRAPHY
Fairly level (approximately 80% hardstanding). Made Ground very likely to be present.
1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover. *2) Look for evidence of Made Ground* *3) Look for evidence of fly tipping* *4) Gradient* *5) Estimate percentage vegetation cover*

SOIL QUALITY
N/A (no access).
If exposed/present describe soil distribution and key characteristics including: *1) the presence of any odours;* *2) coloured or oily deposits on the soil surface;* *3) litter build up on soil surface;* *4) absence of worm casts unless soil is naturally acidic;* *5) soil structure etc.*

SITE DRAINAGE

Culverted River Rea on site.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

N/A (no access).

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

Where present, often overgrown semi-mature/mature grasses/trees/bushes. Appears relatively healthy although viewed from a distance.

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

N/A.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

None noted.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE
Manholes; overgournd pipes; culverted River Rea.
1) Are there any above or below ground bulk fuel or chemical storage tanks? *2) Are there any above or below ground pipe work used to convey chemicals or fuels?* *3) Any evidence of spillage/leakage?* *4) Comment on integrity of storage facilities?* *5) Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?* *6) Are spill kits apparent?* *7) Any substations and is the date of installation known. Pre 1986 may contain PCB.* *8) Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)
Undeveloped land/roads. Former gas works – suspected partially un-remediated. Inactive pit (historical)
1) Describe specific process lines and operations on site? *2) Are there any established/accredited process, environmental management, waste management systems/protocols in place?* *3) Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?* *4) Any evidence of the site ever being involved in military activities.* *5) Any discharge consents/abstraction licenses?* *6) Any process controls e.g. LAPPC, IPPC*

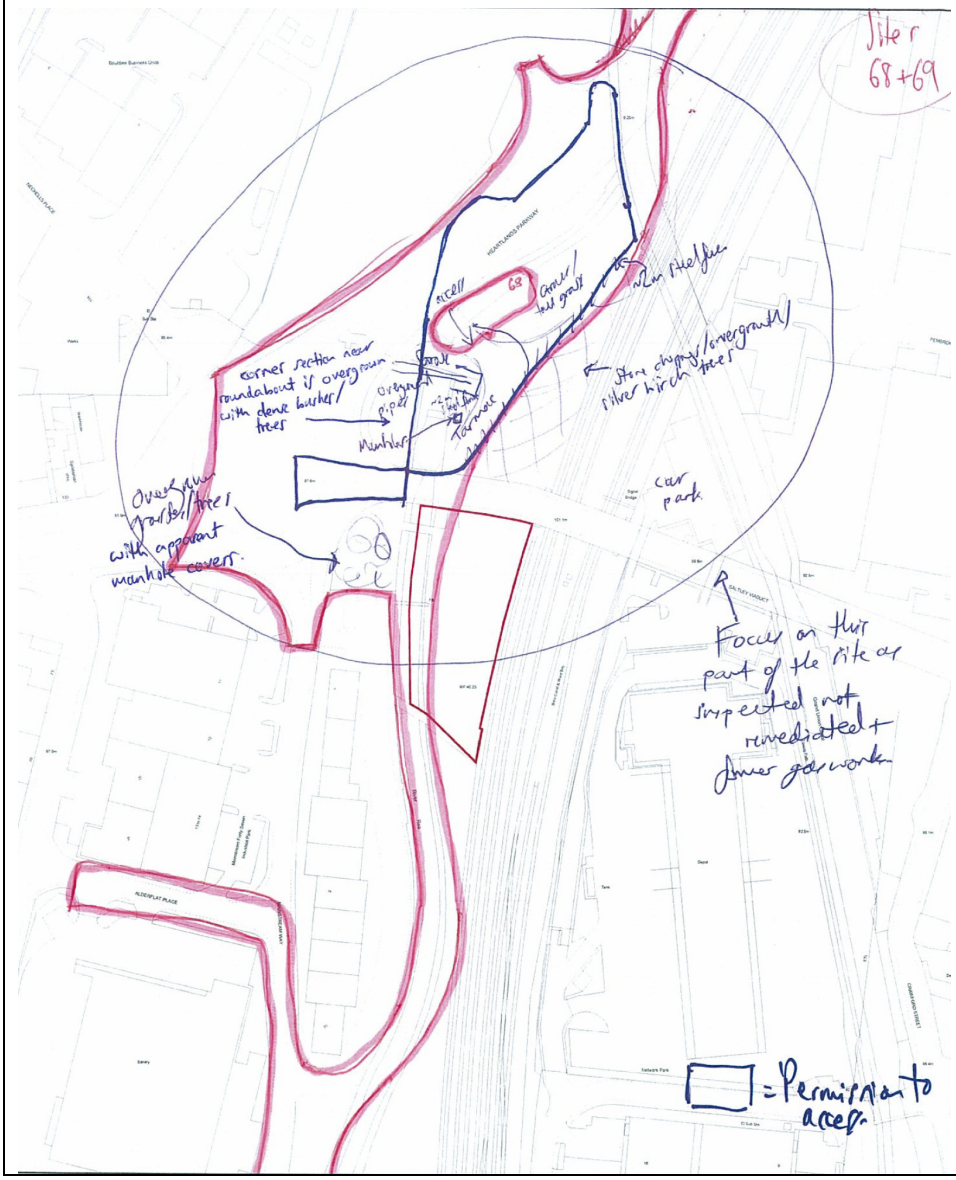
VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION
None noted (no access).
1) State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials *2) Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE	
NORTH	Smurfit Kappa.
NORTHEAST	Railway; Saltley Business Park.
EAST	Railway and Network Park/Saltley Business Park beyond.
SOUTH EAST	Railway and Network Park.
SOUTH	Various commercial land uses.
SOUTHWEST	Various commercial land uses.
WEST	Various commercial land uses.

SURROUNDING LAND USE	
NORTHWEST	Smurfit Kappa.
GENERAL	

1) Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.
2) Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)

MISCELLANEOUS COMMENTS/NOTES





Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



Photograph 7



Photograph 8

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	Eastside Locks (BCC Land Ownership)

PROJECT REFERENCE:	47062728	**DATE:**	30/04/2013
PREPARED BY:	Land quality project team	**NGR:**	408070 287257

WEATHER:	Dry; slight breeze; 7/8 cloud cover

OVERVIEW SITE DESCRIPTION

Accessible part grassland with low-level fencing. Site cleared presumably for development – some development in progress in the north west by BCU.

Digbeth Branch Canal dissects the middle of the site.

Two apparent listed buildings – north west. One building in centre east – house.

Purpose is to ascertain whether any evidence of earthworks/remediation/soil having been turned over as BCC have had no update from developer.

Prior knowledge of the site - aware of isolated hotspots of VOC impacted ground and groundwater – not widespread. Current status unknown.

1) *Provide a generalised description of the site and main activity*

TOPOGRAPHY

Generally level, split into different plots with unmanaged vegetation growth in some and grassland in others.

1) *Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover.*
2) *Look for evidence of Made Ground*
3) *Look for evidence of fly tipping*
4) *Gradient*
5) *Estimate percentage vegetation cover*

SOIL QUALITY

Known Made Ground.

No access was available to the full site.

Mostly grassed cover/vegetated cover.

No evidence of recent earthworks turning over of soil. (It had been suggested by BCC that this may have been undertaken by the developer to investigate contaminant hotspots, although they had not evidence to suggest this had happened).

If exposed/present describe soil distribution and key characteristics including:

1) *the presence of any odours;*
2) *coloured or oily deposits on the soil surface;*
3) *litter build up on soil surface;*
4) *absence of worm casts unless soil is naturally acidic;*
5) *soil structure etc.*

SITE DRAINAGE

No apparent issues / ponding.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

Nothing unexpected in Digbeth Branch Canal.

Some littering on canal side and in water.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

Mostly rough grasses and overgrown shrubs – limited access.

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

Not assessed in any great detail due to limited access. No Japanese Knotweed noted.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

One derelict and boarded house.

One apparent listed building (Moby Dick's Pub)?

Belmont Works building (Metal Works) – looks like façade retained due to possible heritage value.

Old substation housing noted in north west.

Digbeth Branch Canal dissects the site.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

N/A.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

Former Microponents – south east corner – electro-metal plating.

Belmont Works (historical metal works).

Chemical, metal and printing works.

None currently - plots fenced off.

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

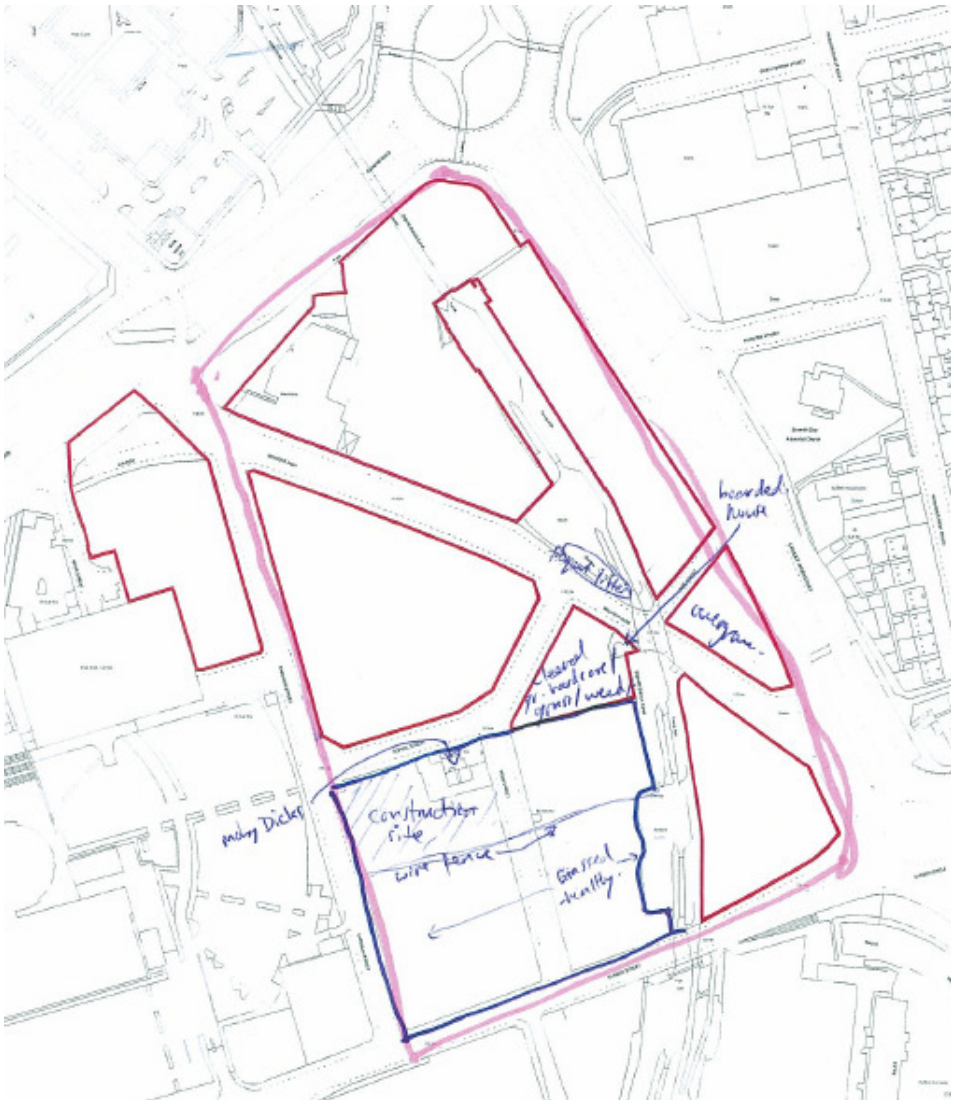
VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION
None noted.

1) State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials
2) Consider old buildings and relic storage/process areas.

SURROUNDING LAND USE	
NORTH	Aston University / Science Park.
NORTHEAST	Roundabout; miscellaneous commercial properties.
EAST	Residential.
SOUTH EAST	Commercial / residential.
SOUTH	Railway viaduct / Curzon Street / student accommodation.
SOUTHWEST	Car park; former Curzon Street Goods Station.
WEST	BCU development / Millennium Point / Eastside Park
NORTHWEST	BCU development / Aston University.
GENERAL	

1) Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.
2) Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)

MISCELLANEOUS COMMENTS/NOTES





Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	UK Mail, Wolseley Drive.

PROJECT REFERENCE:	47062728	**DATE:**	30/04/2013

PREPARED BY:	Land quality project team	**NGR:**	408070 287257

WEATHER:	Bright; sunny; dry; slight breeze; ~4/8 cloud cover

OVERVIEW SITE DESCRIPTION

UK Mail Depot – mail distribution.

Typical warehouse depot including forklift operation, numerous pallets/packages/mail/conveyor belts.

1) Provide a generalised description of the site and main activity

TOPOGRAPHY

Generally level. Approximately 90-95% building cover/hardstanding; remainder is soft landscaping. Generally concrete (including concrete slab in warehouse); block paving in roadways; tarmac/gravel in western part of the site (parking area for trucks); tarmac in visitor car park.

Earth bunds (approximately 2.5 – 3.0 m in height) in the west of the site – heavily vegetated and apparently not very well maintained. Storage of rock salt and pallets to the west of these bunds at the western boundary.

1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover.
2) Look for evidence of Made Ground
3) Look for evidence of fly tipping
4) Gradient
5) Estimate percentage vegetation cover

SOIL QUALITY

Where exposed apparently healthy, brown sandy topsoil. Some litter (general sweet wrappers, paper) especially near boundaries, near earth bunds in the west and near waste management area.

If exposed/present describe soil distribution and key characteristics including:
1) the presence of any odours;
2) coloured or oily deposits on the soil surface;
3) litter build up on soil surface;
4) absence of worm casts unless soil is naturally acidic;
5) soil structure etc.

SITE DRAINAGE

Surface drainage evident in external areas (drains/concrete channels).

Evidence of surface ponding near to the wash down area (appears clean with no sheen on surface), near to water (?) tap points in fuel filling area (appears clean) and in areas of tarmac/gravel depressions in the west (appears clean).

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

Standing water appears clean.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

Landscaped areas are often grassed; healthy, well maintained. Semi-mature/mature bushes/trees just outside of boundaries (especially north and east boundaries). Heavily vegetated earth bunds in the west – appears unhealthy in areas and not very well maintained (grasses/nettles/weeds, semi-mature bushes/trees).

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

Earth bunds in the west but no obvious issues.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

Main depot building (approximately 270 x 65 m) is a 'sort centre'; approximately 10-15 m in height; steel framed with a slightly pitched roof. Includes internal offices (not escorted around offices). No photographs were allowed inside the main sort centre.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

Electric fence surrounding all boundaries (except around visitor car park)

Wash down unit/area – includes brick built structure (approximately 3 x 3 x 3 m) housing equipment/storage containers. Diesel odour.

Electricity sub-station (brick build, approximately 2 x 3 m and 2 m in height) – apparently of fairly recent build so unlikely to be a PCB issue.

Fuel filling area at south west corner of the site:

- Four diesel pumps (USTs) (smaller ones are 2500 L capacity; blue one has unknown contents but reads 'do not add to diesel') and four ASTs (at least one is diesel) – all on substantial concrete slabbing.
- Flogas (on block paving)
- 'Leaks and spillages' brick built structure (approximately 4 x 2 x 2 m) with a flat roof. Appears to house a hand operated pump with empty oil (?) canisters adjacent and a drip tray on the ground beneath. Localised oil/diesel staining (approximately 0.5 x 0.5 m) evident on the ground near to this building and near to fuel pumps.

Floodlights/security cameras.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

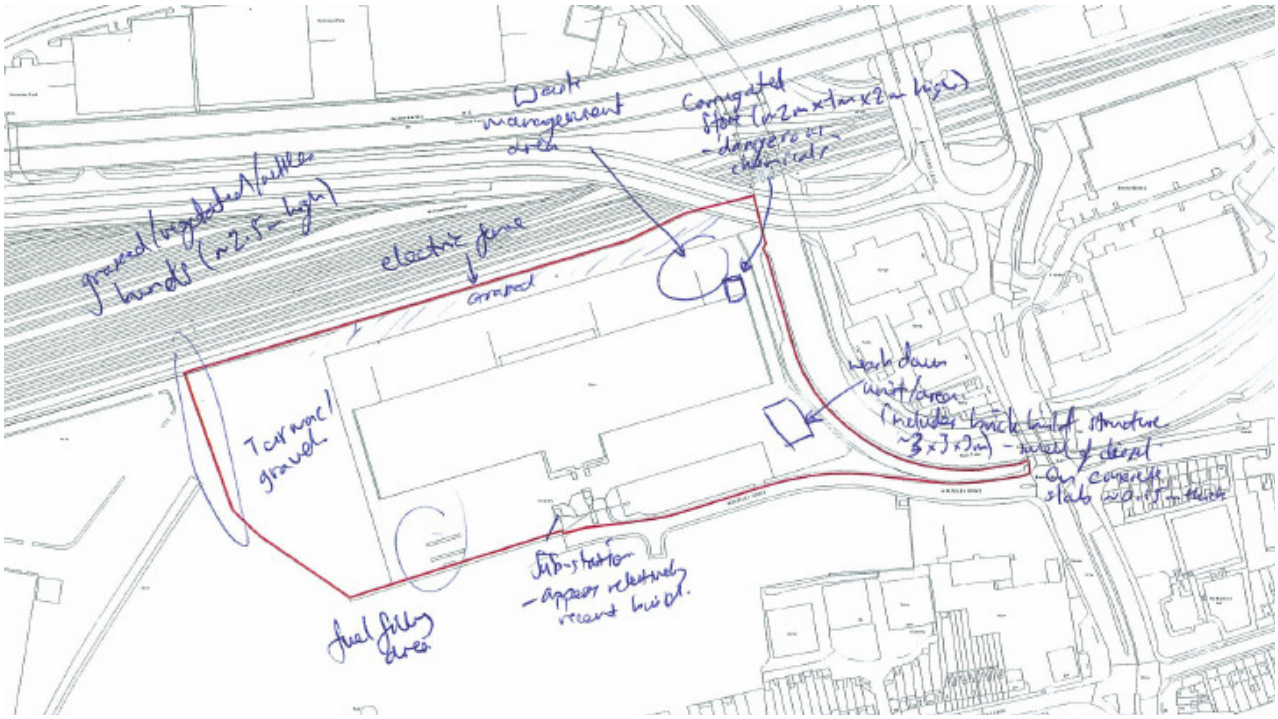
Mail distribution (current), former sports field, landfill/refuse heap

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION
Diesel smell in structure at wash down area. Waste management area – evidence of detergent containers (possibly contaminative) Localised oil/diesel staining around fuel filling area (up to approximately 0.5 x0.5 m) especially near to fuel pumps and 'leaks and spillages' building.
1) State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials *2) Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE	
NORTH	Railway and A47 (Heartlands Parkway). M6 beyond.
NORTHEAST	Heartlands Parkway, railway, River Tame (lower elevated relative to the site), commercial/industrial land use.
EAST	River Tame adjacent; commercial/industrial land use beyond.
SOUTH EAST	Commercial/industrial land use with residential beyond.
SOUTH	Commercial/industrial land use (including former LDV site) with residential beyond.
SOUTHWEST	Former LDV site (now levelled and undeveloped).
WEST	Former LDV site.
NORTHWEST	Former LDV site; railway.
GENERAL	
1) Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination. *2) Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*	

MISCELLANEOUS COMMENTS/NOTES

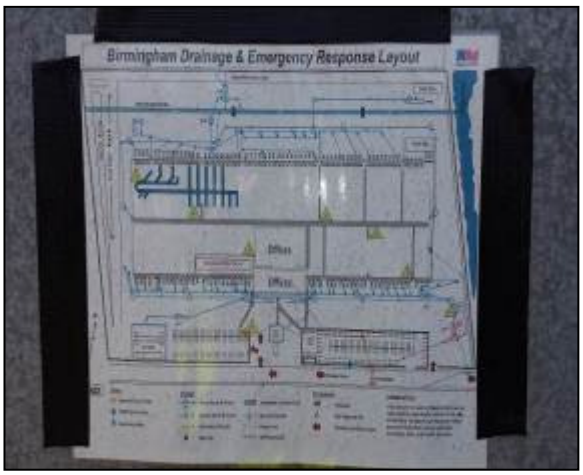




Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



Photograph 7



Photograph 8



Photograph 9



Photograph 10

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	CEMEX (Sleeper Plant), Aston Church Road, Birmingham, B8 1QF

PROJECT REFERENCE:	47062728	**DATE:**	10/07/2013
PREPARED BY:	Land quality project team	**NGR:**	410123, 289139 (at approximate centre)

WEATHER:	Dry; sunny spells; slight breeze; ~7/8 cloud cover

OVERVIEW SITE DESCRIPTION

Sleeper Plant – manufactures sleepers for railway and London Underground.

Approximately 300 tonnes aggregate delivery per day.

24 hour, 7 days a week operation; approximately 90% of production shipped within the UK.

Factory constructed around 1990.

1) Provide a generalised description of the site and main activity

TOPOGRAPHY

Generally level.

Generally concrete (good quality) with tarmac near the main entrance in the car parks.

No evidence of Made Ground.

Nearly all hardstanding – approximately 98% hardstanding and 2% vegetative cover.

1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover.
2) Look for evidence of Made Ground
3) Look for evidence of fly tipping
4) Gradient
5) Estimate percentage vegetation cover

SOIL QUALITY

Where exposed (generally near sidings in the north) appears clean.

If exposed/present describe soil distribution and key characteristics including:
1) *the presence of any odours;*
2) *coloured or oily deposits on the soil surface;*
3) *litter build up on soil surface;*
4) *absence of worm casts unless soil is naturally acidic;*
5) *soil structure etc.*

SITE DRAINAGE

Several surface water drains.

Only surface water noted was either inside or just outside the main factory building (due to injection from the saw whilst cutting the concrete and used as a dust suppressant).

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

On factory floor – appears clean. Some ponding in the sleeper storage area in the north – appears clean. Site escort highlights that there is known to be a high water table in the area and this ponding is often related to this.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

Only minimal, at boundaries and in landscaping (near entrance). At boundaries – weeds/semi-mature shrubs and grasses (some unhealthy in appearance); in landscaped areas, grasses and semi-mature trees, healthy in appearance.

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
   a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
   b) *Do trees appear stunted or diseased?*
   c) *Are there areas of poorly vegetated or bare patches of ground?*
   d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
   e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

N/A.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

Red brick reception building; two storeys with pitched roof.

Several corrugated steel framed factory/process buildings approximately 10 m in height – concrete slab bases.

Intake hopper – stores aggregates.

Cement silos (55 tonnes capacity) – 250 tonnes per week produced.

Approximately 2 m high steel fence near sidings at northern boundary.

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

Bunded tanks at eastern boundary: One 2,000L '10-OP' tank and one 5,000L Eco-fine oil tank (like vegetable oil). Both approximately 90% water in mix and both on approximately 0.40 m thick concrete slab. Some black staining on the pad.

Electricity sub-station at south of main factory building (factor built approximately 1990).

In same area as sub-station – 10,000L diesel tanks (approximately 15,000L per day). Don't have IBCs in use on site anymore – banned on most CEMEX sites (not got good enough integrity). Also, oil store and gas oil store in same area.

Clipping Station – fits clips to sleepers (saves workmen doing this on site when laying the tracks).

Three rail sidings at northern boundary for export of sleepers.

Storage bays (near entrance) – sand; 10 mm and 20 mm limestone (used as surplus aggregate when low on delivery)

Waste management area (adjacent north of the centre of the main factory) – skips containing fibre plastic bags (used for the delivery of aggregate). Also Wood Waste point and concrete waste bay. Emptied once every couple of weeks. Nearly all waste is recycled (dispose do by going to an appropriate licensed facility)

Hazardous Waste area including compressed gas and waste oil adjacent west of main factory building.

Bunded tanks for admixtures for concrete (2 * 8000L each) and adjacent filter pits (approximately 12 feet deep) adjacent west of the main factory building. The filter pits are for waste water management – series of pits where water become clearer in each. Eventually, water is pumped out to the foul drain (near the entrance) (not to surface water). 5000L per day is allowed to be discharge under a license with the LA. It is mains water which is used in the process (not recycled water). The slurry left in the filter pits is dug out and put into the concrete waste bay for disposal.

General waste skip and waste strand skips near entrance.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

Currently an operational sleeper factory (24 hours, 7 days a week). Manufacture concrete sleepers for railways.

Formerly an old clay pit/brick kiln/sidings/undeveloped land.

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION

No pollution incidents/spillages according to site escort.

Black staining on pad of bunded tanks at eastern boundary.

Oil/black staining associated with engines (trains) on the sidings/rail tracks.

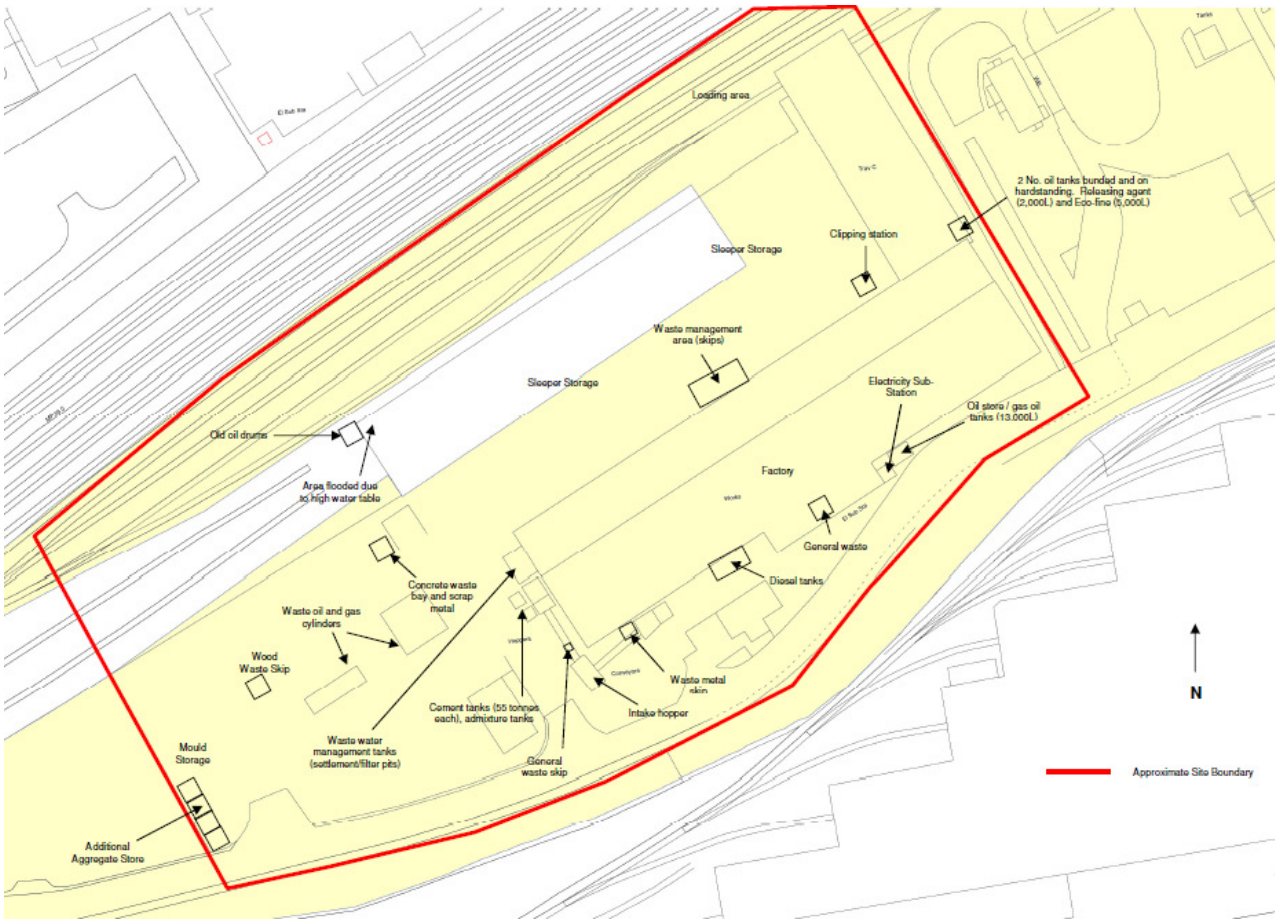
1) *State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials*
2) *Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE

NORTH	Railway
NORTHEAST	Railway
EAST	CEMEX Asphalt Plant
SOUTH EAST	Alstom Works (railway car/carriage manufacturing)
SOUTH	Alstom Works (railway car/carriage manufacturing)
SOUTHWEST	Alstom Works (railway car/carriage manufacturing)
WEST	Hanson Birmingham (Ready-mix Concrete)
NORTHWEST	Railway
GENERAL	Site does not seem markedly different from surrounding area (industrial/commercial land use). Apparently slightly lower elevation than the Alstom Works to the south.

1) *Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.*
2) *Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*

MISCELLANEOUS COMMENTS/NOTES

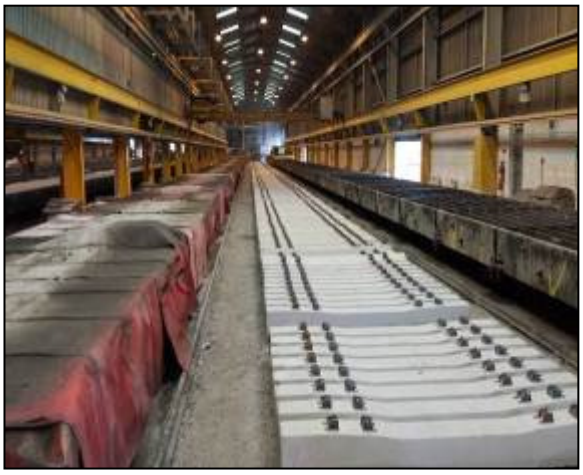




Photograph 1 – Intake Hopper



Photograph 2 – Looking North from Site Entrance



Photograph 3 – Inside Main Factory Building



Photograph 4 – '10-OP' Oil Tank at Eastern Boundary



Photograph 5 – Clipping Station near Eastern Boundary



Photograph 6 – Loading Area Looking West



Photograph 7 – Flooded Area Due to High Water Table



Photograph 8 – Looking East from near the Western Boundary



Photograph 9 – Waste Oil, Gas Cylinders and Hazardous Waste Area



Photograph 10 – Waste Water Management Area



Photograph 11 – Diesel Tanks

GEO-ENVIRONMENTAL SITE INSPECTION PRO FORMA

PROJECT:	HS2 West Midlands Contract 254

SITE ADDRESS:	CEMEX (Asphalt Plant), Aston Church Road, Birmingham, B8 1QF

PROJECT REFERENCE:	47062728	**DATE:**	10/07/2013

PREPARED BY:	Land quality project team	**NGR:**	410314, 289234 (at approximate centre)

WEATHER:	Dry; sunny spells; slight breeze; ~7/8 cloud cover

OVERVIEW SITE DESCRIPTION

Asphalt Plant – built in 1985. Serves the Public Fund initiation (PFA) which involves the resurfacing of all of Birmingham's roads over the next 20 years (so will need to find somewhere to relocate once moved by HS2 in order to honour the PFI contract).

Can serve as far afield as Milton Keynes but depends on shelf life of the asphalt and the type of transport (i.e. well enough insulated for long hauls?)

300,000 tonnes of stone per year being received. Limestone comes from Doveholes (Buxton) and hardstone comes from Cumbria – delivered by train.

Process involves drying stone to over 150 degrees C, adding bitumen and mixed before being shipped away by truck. ISO 14001 accredited.

1) Provide a generalised description of the site and main activity

TOPOGRAPHY

Generally level. Some localised depressions where hardstanding has worn away.

All concrete hardstanding with tarmac over the top (medium/good quality). Factory area and tanks on concrete, only area of just tarmac is in waste area in the east and in visitor car park in the west.

Approximately 85% hardstanding and rest is unprotected ground (landscaping at boundaries and in the west of the site.

1) Estimate percentage hard cover/buildings to unprotected ground and include comment on the quality/condition of cover.
2) Look for evidence of Made Ground
3) Look for evidence of fly tipping
4) Gradient
5) Estimate percentage vegetation cover

SOIL QUALITY

Where exposed appears clean brown sandy topsoil.

If exposed/present describe soil distribution and key characteristics including:

1) *the presence of any odours;*
2) *coloured or oily deposits on the soil surface;*
3) *litter build up on soil surface;*
4) *absence of worm casts unless soil is naturally acidic;*
5) *soil structure etc.*

SITE DRAINAGE

Surface water drains evident.

Oil Interceptor in surface drainage.

Some standing water in localised depression sand lots in the south of the site in the aggregate storage area where sprinklers are in operation for dust suppression.

1) *Describe observations of any standing water or poor drainage*
2) *Note any drainage system or presence of interceptors/catchment drains particularly in areas of bulk fuel/chemical storage and use on industrial sites. Comment on condition/integrity*

WATER QUALITY

Standing water appears clean.

1) *Assess the quality of any standing or running water either on site, or running to from the site.*
2) *In particular look for turbidity of the water, discolouration, odours, foaming, presence of sewage fungus, presence of oily sheen or oil deposits, gas bubbles, lack of fauna or vegetation.*

VEGETATION COVER

At boundaries and in areas of landscaping. Generally healthy semi mature/mature bushes and trees, also weeds and grasses.

1) *Describe distribution and note presence and absence across the site.*
2) *Comment on type e.g. shrub, grass, young, semi-mature and mature trees, hedgerow, marsh etc. and diversity*
3) *Mature trees indicate site may have been undisturbed for some time.*
4) *Do young trees and saplings appear to have regenerated naturally – indicative of good soil and drainage?*
5) *Any evidence of vegetation stress or is an otherwise uniform distribution interrupted? Pay particular attention to:*
    a) *Look for visible signs of plant distress or discolouration, poor root and nodule development.*
    b) *Do trees appear stunted or diseased?*
    c) *Are there areas of poorly vegetated or bare patches of ground?*
    d) *Are there any uncharacteristic plant assemblages for location, climate, soil type and period of colonisation?*
    e) *Are there any indicator species e.g. metal tolerant species?*

ECOLOGICAL ISSUES (OUTLINE)

Ecological survey undertaken last year for the HS2 project. Site Manager unsure of what the findings were, but suspects that not many species would tolerate the high temperatures of the main factory area.

Wildlife area (including trees and a fox) to the south of the site between the site and the Alstom Works.

1) *Not intended to replace a formal ecological assessment but to highlight any standout potential constraints*
2) *Look for surface water features and potential aquatic habitats on site and in the immediate surrounds.*
3) *Is there any evidence of fauna e.g. burrows, droppings, animal prints?*
4) *Evidence of bat roost potential e.g. open roof spaces*
5) *Presence of knotweed or invasive species?*

BUILDINGS AND LARGE INFRASTRUCTURE

Several large steel framed structures – storage bays. Each bay contains a different type of stone – measured in 'Polished Stone Value' (PSV); the higher the PSV the better the stopping distance. Motorways are 68 PSV; hardstone starts at approximately 55PSV whilst Limestone polishes up to well and is almost like ice in the wet so zero PSV. Bays are steel/wood. Any waste/excess asphalt is stored here before getting recycled and fed back into the process.

Main factory building is steel framed approximately 20 m high with chimney stacks.

Dust silos to collect most of dust rather than just releasing it to the atmosphere via stack.

Brick building offices (one and two story) pitched roof.

Many of the buildings are on steel stilts – purely to allow for plant access/egress (unrelated to any potential gas issues of which none are known according to the site escort).

1) *Consider the number and distribution of buildings, construction type, presence of asbestos (visual only), number of storeys , stability, note headroom and access in terms of any ground investigation techniques that might be employed.*
2) *Only enter a building if safe to do so.*
3) *Consider the potential for the building to be listed or to have historic value*
4) *Note any evidence or indicators that contamination may have taken place*

ANCILLIARY INFRASTRUCTURE

Oil Interceptor installed in surface drainage system – exits to main sewer.

Numerous tanks including bitumen tanks; flux tanks; vapour silos – all ones containing liquid are bunded. Only tanks not bunded are bitumen tanks as they do not need to be (dry). All tanks on concrete slabs. Also gas oil and kerosene tanks (30,000L each) – bunded. More information on the tanks and their capacities is included on the attached sheet.

Electricity sub-station (one storey brick building flat roof) near the entrance is for the incoming; then a larger sub-station is more central on the site (similarly one storey brick building flat roof) which powers the plant.

Port-a-cabins near offices – double-decked.

Aggregate store in the east of the site – storage bays.

1) *Are there any above or below ground bulk fuel or chemical storage tanks?*
2) *Are there any above or below ground pipe work used to convey chemicals or fuels?*
3) *Any evidence of spillage/leakage?*
4) *Comment on integrity of storage facilities?*
5) *Are containment measures in place e.g. bunds and are they in good condition and sufficient in size to contain the volume stored in the tanks in the event of an incident?*
6) *Are spill kits apparent?*
7) *Any substations and is the date of installation known. Pre 1986 may contain PCB.*
8) *Any other raw material storage areas, treatment or process areas?*

SITE OPERATION (PAST AND PRESENT)

Currently an operational asphalt plant. Formerly sidings/undeveloped land.

1) *Describe specific process lines and operations on site?*
2) *Are there any established/accredited process, environmental management, waste management systems/protocols in place?*
3) *Are there any residual indicators of a sites past use e.g. old fences/gates , floor slabs, old tanks?*
4) *Any evidence of the site ever being involved in military activities.*
5) *Any discharge consents/abstraction licenses?*
6) *Any process controls e.g. LAPPC, IPPC*

VISUAL OR ANECDOTAL EVIDENCE OF CONTAMINATION

Two fires where the fire brigade have had to be called to put them out, but no known spills/pollution incidents as long as Site Manager has worked there.

Asphalt excess on ground in main factory area where trucks are loaded.

Main concern is bitumen spills, but even with these simply put sand down as a barrier to prevent migration.

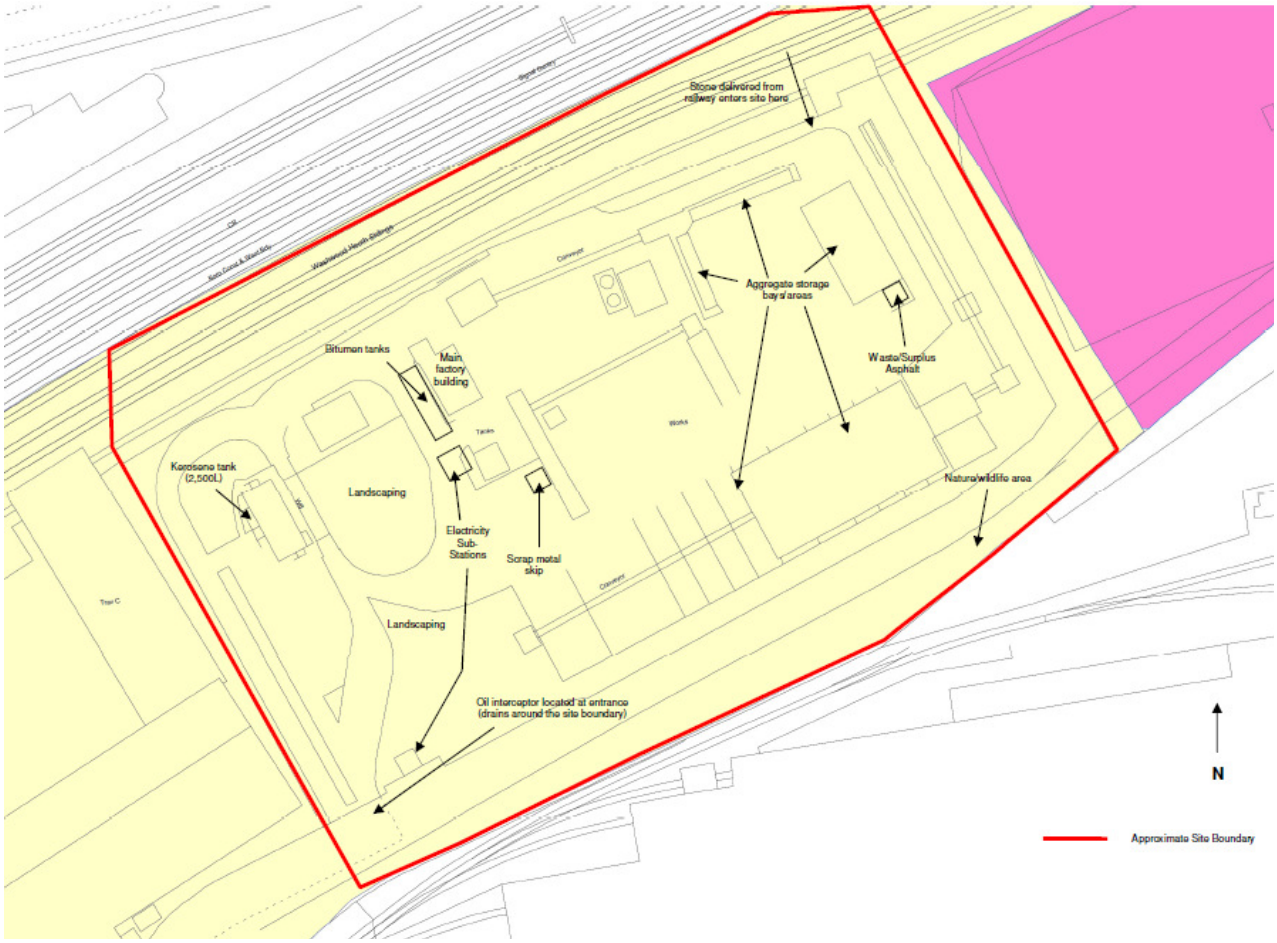
1) *State nature and type e.g. staining, oil sheen, free product, soil discolouration, oil drums, leaks/spills, discarded drums that may contain residual materials*
2) *Consider old buildings and relic storage/process areas.*

SURROUNDING LAND USE

NORTH	Railway
NORTHEAST	Railway
EAST	TRT area – used for sleeper storage. CEMEX Sleeper Plant claimed that this was not there land and they did not have access. According to the site escort at the Asphalt Plant, the land is rented by the sleeper plant for storage of sleepers. Appears hardstanding and relatively level.
SOUTH EAST	Alstom Works (Railway Manufacture)
SOUTH	Alstom Works (Railway Manufacture)
SOUTHWEST	Alstom Works (Railway Manufacture)
WEST	CEMEX Sleeper Plant
NORTHWEST	Railway
GENERAL	Site does not seem markedly different from surrounding area (industrial/commercial land use). Apparently slightly lower elevation than the Alstom Works to the south.

1) *Identify both sensitive receptors, e.g. residential, nature reserves, schools, SSSI as well as potential off site sources of contamination.*
2) *Consider whether the subject site appears markedly different to its surroundings in terms of topography, drainage, vegetation and soil type (if apparent)*

MISCELLANEOUS COMMENTS/NOTES





Photograph 1 – Kerosene Tank near Western Boundary



Photograph 2 – Port-a-cabins near Western Boundary



Photograph 3 – Bitumen Tanks near Main Factory Building



Photograph 4 – Looking South from Main Factory Building



Photograph 5 – Looking South from North Eastern Boundary



Photograph 6 – Ponded Water near Aggregate Storage Bays



Photograph 7 – Aggregate Storage Bays in the East of the Site



Photograph 8 – Looking West from the Centre of the Site



Photograph 9 – Main Factory Building



Photograph 10 – Gas Oil Tanks to the East of the Main Factory Building

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Phase II Environmental Site Investigation LDV, Drews Lane, Washwood Heath, Birmingham

SITE LOCATION:	Drews Lane, Washwood Heath, Birmingham

DATE PREPARED	October 2003	**DATE REVIEWED**	12 December 2012

AUTHORED BY:	Environ	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Environmental site investigation for potential acquisition of part of LDV site. Targeted GI.

SCOPE OF REPORT
44 WS holes, 38 boreholes of which 35 were installed as groundwater monitoring wells. Lab testing and monitoring, interpretive report. Refers to Dutch values as a screening tool.

CONCLUSIONS
Groundwater flow north east towards R Tame (200 m away) 17 AST reported to have been present housing fuels, oils, water and gas. Mostly concentrated between Pres Shop and Paint Shop and east of Press Shop. Localised hydrocarbon contamination of groundwater Metal contamination in the MG TCE and DCE contamination of groundwater in about one third to a half of samples although noted concentrations across main factory part of LDV site not as high as to the north east on the former vehicle storage area (here up to 10,000 ug/l DCE recorded in previous GI). Excluding vehicle storage area concentratiosn recorded ot be below Dutch screening values.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Medium to high (if site redeveloped)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Site Investigation Report Business Post, Heartlands Central, Washwood Heath

SITE LOCATION:	Heartlands Central, Washwood Heath

DATE PREPARED	11th July 1996	**DATE REVIEWED**	12 Dec 2012

AUTHORED BY:	Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Essentially a dig and dump strategy. Refers to estimated quantity of 7043 m^3 oil saturated soil at 2.25 m depth, 0.75 m thick to be removed. Refers to Areas A, B and C shown on the appended plan, but plan shows only areas B, C and D. Site appears to correspond to the former vehicle storage area of LDV (east part of the site) and the eastern part of the main LDV manufacturing facility, as well as what is now the UK Mail site.

SCOPE OF REPORT
Reclamation Strategy

CONCLUSIONS
Unclear whether implemented. Makes general comments about contamination not significant enough to constrain development. Other reports may give more insight that this into what is there and what was done.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Factual Report Phase 2 Site Assessment LDV Ltd, Wolseley Drive, Washwood Heath, Birmingham. Prepared for LDV Ltd & AXA Real Estate Investment Managers Ltd.

SITE LOCATION:	Former LDV, Birmingham

DATE PREPARED	March 2005	**DATE REVIEWED**	19 Dec 2012

AUTHORED BY:	Environ	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Investigation undertaken in connection with AXA's proposal to purchase the freehold interest of the site and follows on from a review of previous third part reports by Environ. The purpose of the investigation was to determine whether asbestos fibres or ACM were present in MG. Comprised of 38No. TPs to max depth of 3.80 m bgl. MG was encountered to depths of between 0.20 m blg and 3.80 m bgl (not fully penetrated). Groundwater was encountered in 18No. of the 38No. Tps in either MG or Glacial Till Deposits at depths between 1.2 m bgl and 3.80 m bgl. Site Layout Plan on system.

SCOPE OF REPORT
Phase 2 Environmental Investigation, factual report, at the former LDV site, Birmingham.

CONCLUSIONS
Visual evidence of asbestos cement sheeting was identified within 10No. of the 38No. TPs and confirmed to be present in 8No. of these ten by an accredited laboratory as chrysotile cement sheets. The only exception was in TP12 where fragments of both chrysotile and crocidolite cement sheeting was positively identified at depths of between 0.30 – 0.50 m bgl. Visual and olfactory evidence of hydrocarbon contamination was identified within 4No. of the 38No. TPs within the Glacial Till Deposits. Heavy hydrocarbon staining and strong hydrocarbon odour was also noted in TP38 at 2.1 m bgl within MG. The depth, in which hydrocarbon staining was noted for soils predominantly, corresponded to just above or at the water strike. The investigation was not intended to address hydrocarbon contamination, such matters having been addressed previously by others.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes (assuming no remediation noted in other reports)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Report on Phase II Ground Investigation Work Carried Out At LDV Heartlands Central, Birmingham

SITE LOCATION:	LDV Heartlands Central, Birmingham

DATE PREPARED	10th April 1996	**DATE REVIEWED**	19 Dec 2012

AUTHORED BY:	DTS Geotechnical & Environmental Engineering	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Phase II to provide understanding of the geotechnical and contamination properties of a site of ~16ha (part of a larger holding which once belonged to Leyland DAF) in relation to proposals to construct a new business park comprising commercial and light industrial usage. ~25% of the site previously investigated by DTS in Nov 1994 – this resulted in remediation of oil/diesel polluted groundwater in two areas of the site; vacuum extraction was used to achieve clean-up levels which are understood to satisfy the DTS's remediation method statement. Plan is same as Ref 010 (on system)

SCOPE OF REPORT

Phase II

CONCLUSIONS

Results did not indicate contamination levels which would be detrimental to the proposals and therefore no soil removal was recommended. It was noted, however, that if small quantities need to be removed, it is very likely that landfill sites would regard the material as contaminated thus affecting disposal costs.

The oil/diesel water pollution is deemed to be sourced from leaking drains/sumps of the former LDV works rather than from the fill itself (hence generating source no longer present). The remnants of this contamination is thought to be trapped in old drains/sumps as well as pockets of stagnant perched groundwater. Recommended to remove the worst of the contamination as well as maintaining the existing hardcover (to minimise water migration through the fill). Areas A and B cleaned.

Gas monitoring does not indicate methane issues in relation to the proposals, whilst GI did not encounter any putresible waste in the fill or significant quantities of peat in the alluvium such that a gas hazard may be present. BHs1-17 recorded <1% by volume CO2, although elevated quantities of up to 8% by volume were found in monitoring points A to D which were situated in Area A which has been cleaned by vacuum extraction methods. This is likely due to disturbance from the vacuum extraction and it seems likely concentrations will reduce to <1% once the ground has equilibrated (so CO2 not considered to present a hazard to the proposals).

There are two outstanding areas (C and D) of groundwater pollution which should be cleaned to the same standard as A and B, thereby remediating the site to a condition satisfactory for the proposed developed.

Note: Figure 1 (which shows Areas A-D) unfortunately missing but the plan associated with '014 CFA26 Former LDV Farebrother and Partners 1996' appears to match roughly with another later plan named Figure 1, dated March 1996 (associated with '029 CFA26 Former LDV Terra Vac 1995') so assume these are probably Areas A-D as referred to from this report.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes (assuming no remediation of Areas C and D noted in other reports)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Report on Ground Investigation Work Carried Out At LDV Heartlands Central, Birmingham

SITE LOCATION:	LDV Heartlands Central, Birmingham

DATE PREPARED	15th December 1994	**DATE REVIEWED**	19 Dec 2012

AUTHORED BY:	DTS Technology Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
This report relates to a GI undertaken at a site of ~16ha (part of a larger holding which once belonged to Leyland DAF) in relation to proposals to construct a new business park comprising commercial and light industrial usage. As a result of previous SI (Acer Environmental, 1993) areas of contaminated ground and groundwater had been identified. This GI aimed to investigate more fully the worst affected areas. 49No. TPs were excavated together with 6No boreholes intended to prove the deeper areas of fill in the western portion of the site. Site plan provided on system. The Acer reports identified two principal centres of contamination and a further three localised areas as follows: (i) The SE corner in vicinity of one of former refuse/spoil heaps (~zone 8 (nearest River Tame)); (ii) Area around old pickling plant; (iii) An area toward north end of Block N; (iv) An area along the western edge of Block L; (v) The SW corner of Block K. Drawings on system.

SCOPE OF REPORT
GI

CONCLUSIONS
The fill deposits contain the bulk of contamination. Two groundwater regimes are considered to be present – a perched body in the fill and the natural body beneath (in alluvium/RTD), with the former not thought to be in continuity with the latter. The perched body was found to be contaminated with traces of mineral oil, diesel, petroleum and kerosene. Discontinuous nature of the perched body and the slow rate at which they would enter controlled water receptors indicate negligible impact, however, remediation was recommended as a precautionary gesture. This should involve localised dewatering/removal of the fill (in zone 8 and the old pickling plant). Must ensure only the fill is dewatered and that attention is made to prevent effluent entering the river. As much hard cover as possible should be preserved to minimise water ingress (also keep landscaped areas to a minimum for the same reason and consider thickness of clean material beneath topsoil and membrane).

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes (although note partial remediation detailed in subsequent reports)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Rachael Cristy Environmental Services Dept Gas Monitoring Data Heartlands Central

SITE LOCATION:	LDV Heartlands Central, Birmingham

DATE PREPARED	??	**DATE REVIEWED**	19 Dec 2012

AUTHORED BY:	Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Appears to simply contain an 'Extract from Acer Environmental Report: March 93 and Southern Science Probe Investigation'.

SCOPE OF REPORT
GI / Gas Monitoring Data

CONCLUSIONS
Notes elevated gas levels. Also seems to include gas monitoring data and data relating to vacuum extraion for Areas A and B.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes (although note this information relates to ongoing remediation of Areas A and B)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	LDV Heartlands Central, Birmingham Site Remediation Method Statement

SITE LOCATION:	LDV Heartlands Central, Birmingham

DATE PREPARED	25th January 1995	**DATE REVIEWED**	19 Dec 2012

AUTHORED BY:	Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
This is a Site Remediation Method Statement based on the results of preliminary SI (Acer Environmnetal 1993, which identified four main areas of contaminated ground and groundwater) and the subsequent DTS Techniology Ltd Report (summarised in Ref 010) which, in November 1994, found two of these areas to be affected to the degree which would benefit from remediation. Site A (in proximity of Zone 8) has an area of ~3000m^2 and estimated could be ~3000 m^3 water trapped in the fill. Site B (in proximity of the Old Pickling Plant) has an area of ~4500 m^2 and estimated could be ~3500 m^3 water trapped in the fill. For Site A ~3500 m^3 of contaminated soil requiring cleaning/removing; for Site B ~2500 m^3. Site Layout/Remediation Area plans on system.

SCOPE OF REPORT
Site Remediation Method Statement for LDV site at Heartlands Central, Birmingham

CONCLUSIONS
N/A

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes (although note this information relates to ongoing remediation)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Site Investigation Report; Business Post; Heartlands Central; Washwood Heath; Birmingham

SITE LOCATION:	LDV Heartlands Central, Birmingham

DATE PREPARED	21st March 1996	**DATE REVIEWED**	20 Dec 2012 / 07 Jan 2013

AUTHORED BY:	Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
This report relates to a SI undertaken at a site representing part of the former Leyland DAF vehicles site (known at the time of writing as Heartlands Central). It acknowledges previous SI undertaken by Acer Environmental and details how this report details subsequent further investigation comprising of TPs and BHs and associated testing.

SCOPE OF REPORT
Factual report on ground conditions encountered and methodology used to achieve, where appropriate the necessary clean-up. It was intended that the report should provide adequate information for a foundation appraisal to be undertaken for future development.

CONCLUSIONS
The investigation found only one area of oil contamination necessitating remediation (source traced to an oil recovery system which was emptied to remove the source). It was stated that the remaining area of ash fill which contained pockets of oily water would be cleaned to achieve a value of 5mg/l by N.R.A leachate of the soils and removal of the free product to below 1mm of oil within the sample wells over a 48 hour period. Phytotoxic metals present prompted the recommendation of a membrane and imported topsoils to mitigate risk to plant growth. High sulphate values in the groundwaters prompted the suggestion that precaution would be required in all below ground concrete works. Five boreholes were drilled in November 1994 to monitor groundwater. Results of monitoring were taken at 3 monthly intervals and were proven satisfactory. The N.R.A were advised of results during and were satisfied with the outcome.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Method Statement and Outline Specification for the Removal of Contaminants at the LDV Heartlands Redevelopment Site Birmingham

SITE LOCATION:	LDV Heartlands Central, Birmingham

DATE PREPARED	11th July 1996	**DATE REVIEWED**	07 Dec 2012

AUTHORED BY:	Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
This is method statement and outline specification for the removal of contaminants at the LDV site. The areas of the site applicable are shown on plan on system file (denoted A, B and C).

SCOPE OF REPORT
Method statement and outline specification for the removal of contaminants at the LDV site. References DTS report (assume report review Ref. 009 based on dates on TP logs appended) as the SI report applicable to the area of works. Covers restoration strategy, compliance monitoring and H&S provisions.

CONCLUSIONS
This is method statement and outline specification for the removal of contaminants at the LDV site. The areas of the site applicable are shown on plan on system (denoted A, B and C).

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Conservatively assume Yes – information does not collaboratively make it clear the extent of remediation undertaken/proposed

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Folder on Saltey Reservoir, Aston Church Lane

SITE LOCATION:	Heartlands Spine Road, Saltey Reservoir, Aston Church Lane

DATE PREPARED	19/12/1991	**DATE REVIEWED**	17th October 2012

AUTHORED BY:	Engineers Department, BCC	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Record on telephone conversation and contamination test results.

SCOPE OF REPORT
Provide test results.

CONCLUSIONS
Some of contaminated material is classified as special waste (Coal tar). Elevated sulphides, metals and toluene extract.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	High – unclear if material was removed/remediated.

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Heartlands LDV Remediation Pilot Scheme Prepared for Farebrother and Partners

SITE LOCATION:	Heartlands LDV, Birmingham

DATE PREPARED	13th June 1995	**DATE REVIEWED**	31 Jan 2013

AUTHORED BY:	Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Terra Vac (UK) Ltd were commissioned by Farebrother and Partners to undertake a four week trial for the remedial works at the Heartlands site. Based on the results, it was the intention that a full-scale system be commissioned to both impacted areas (later reference made to Area A and B so assume it means these). Purpose of trial was to establish the validity of dual vacuum extraction technology as a remedial process for the decontamination of the perched groundwater within the site. Target remediation levels and site data are as indication in DTS Technology Ltd LDV Heartlands Central, Birmingham, Site Remediation statement (Contract No. 6154). See Drawing Reference folder on system for Site Layout Plan. Also another larger drawing showing the contamination source areas (similar to that which accompanied Ref 014) came with this report and so is referenced as such on the system file.

SCOPE OF REPORT
Remediation Pilot Scheme Report.

CONCLUSIONS
Concluded that Zone A and B would be amenable to remediation utilising vacuum extraction methods. Due to programme restraints, it was suggested that the full 26 week be undertaken and, as a safeguard, additional remedial measures (suggested in-situ air partitioning of the groundwater combined with the addition of water soluble nutrients to enhance natural bio-degradation) adopted to further accelerate the process

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Conservatively assume Yes – information does not collaboratively make it clear the extent of remediation undertaken/proposed

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Heartlands Central, Birmingham (Letters)

SITE LOCATION:	Heartlands LDV, Birmingham

DATE PREPARED	13th, 28th March 1995	**DATE REVIEWED**	31 Jan 2013

AUTHORED BY:	DTS and Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Two letter from DTS and Farebrother and Partners detailing groundwater monitoring (including monitoring of the water table along the line of the River Tame to identify if oil is seeping from any other area of the site into the river) and also surface water samples from the infall/outfall of the culvert which crosses the site from the adjacent river Tame.

SCOPE OF REPORT
Two letter from DTS and Farebrother and Partners detailing groundwater and surface water monitoring

CONCLUSIONS
Third set of monitoring indicated much the same as previously. Total hydrocarbon content of all but one sample (12.93 mg/l in BH6 in remediation Site A) did not exceed the site clean up specification of 5 mg/l. Stream water results do not indicate any significant pollution apart from a mall amount of diesel which did not exceed 0.260 mg/l. No apparent significant difference between the upstream (entering site) and downstream (leaving site) sample. Monitoring stated to be on-going but it is highlighted that at the time of writing, aside from the initial drill samples, the remaining samples identify a very low level of hydrocarbons.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A – but note incomplete data

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Heartlands Central, LDV Site (Letters)

SITE LOCATION:	Heartlands LDV, Birmingham

DATE PREPARED	17th April and 20th June 1996	**DATE REVIEWED**	31 Jan 2013

AUTHORED BY:	Terra Vac and Farebrother and Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Two letters from Terra Vac and Farebrother and Partners detailing partial ground gas monitoring results (second set) for the boreholes installed by DTS. The results represented an overall improvement in oxygen, carbon dioxide and methane concentrations at wells VE11, VE12 and VE14 relative to previous monitoring from December 1995. VE17 indicated improvement in oxygen and methane but a slight worsening in carbon dioxide (increase from 3.1% to 3.4%). All three gases increased in concentration at VE13. The carbon dioxide concentrations at wells VE12, 13, 14 and 17 are above the ICRCL trigger value of 1.5% in air and the methane concentrations at all five wells monitored are well below the 5% in air LEL.

SCOPE OF REPORT
Two letters from Terra Vac and Farebrother and Partners detailing partial ground gas monitoring results.

CONCLUSIONS
Proposal stated by Farebrother and Partners to issue the information to contractors working on the site with particular emphasis on precautions on working in trenches with respect to carbon dioxide levels. It was stated that the 'Business Post proposals do not incorporate any basement or below ground areas and hence we have recommended a passive gas membrane to be installed beneath the slab only as a precautionary measure' and that 'Area A monitoring data will follow shortly which I believe should complete this element of the works'.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Elevated carbon dioxide levels noted (note that this is when compared against outdated ICRCL trigger values and that data assessment provided is partial)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Industrial Site Washwood Heath Environmental Audit Desk study Assessment

SITE LOCATION:	Heartlands LDV, Birmingham

DATE PREPARED	March 1993	**DATE REVIEWED**	31 Jan 2013

AUTHORED BY:	Acer Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Acer Environmental was commissioned by the Birmingham Heartlands Development Corporation to undertake an environmental review and site assessment of part of the Leyland DAF site. The report assesses the current environmental liability the site poses and any redevelopment implications.

SCOPE OF REPORT
Desk Study.

CONCLUSIONS
Missing pages 27-35 but various sections of the report clearly indicate potential for contamination.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Heartlands Central, Land Quality Statement

SITE LOCATION:	Heartlands LDV, Birmingham

DATE PREPARED	8th November 1993	**DATE REVIEWED**	31 Jan 2013

AUTHORED BY:	Acer Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Acer Environmental Quality Assurance issued a Land Quality Statement for the site. Birmingham Heartlands Development were considering acquisition and redevelopment of ~20 hectares of land at the van plant – a rapid audit was required, identifying the main liabilities and constraints. It was accepted that preliminary SI may be required to support the audit opinions. The audit identified several issues of concern relating to landfilling [prior to development both on and off site. Also sensitive groundwater regime and receptors (river). However, in other environmental respects the site was in good order and redevelopment looked achievable. Acer mobilised a 'geoprobe'-type investigating to get initial information from suspect locations – gained information within one week. Results presented and acquisition went ahead. Additional GI done in September 1993.

SCOPE OF REPORT
Land Quality Statement

CONCLUSIONS
The audit and preliminary SI identified localised contamination in the northern area of the site particular issues including: landfilling occurred raising level consistent with 1970s development; fill is contaminated (consistent with wastes from documented on-site manufacturing); and on-site wastes were probably supplanted by imported contaminated fills. Preliminary SI suggested elevated phytotoxic metals but also locally modest levels of arsenic, cadmium and cyanide; oil (related to confined areas of specific use). Levels only slightly in excess of the UK guidance's thresholds concentrations for phytotoxicity, Group A open space and buildings/hard cover as appropriate. Only one location of significant methane emission, in excess of the LEL (suspected possibly associated with the last phase of infilling in the northern area (c. 1977)). Rest of document is missing (after Section 2.3).

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Heartlands Central, Remediation (Letters)

SITE LOCATION:	Heartlands LDV, Birmingham

DATE PREPARED	24th September 1996	**DATE REVIEWED**	01 Feb 2013

AUTHORED BY:	Farebrother and Partners and Environment Protection Unit	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Two letters firstly from Farebrother and Partners and secondly a response by Environment Protection Unit.

The Farebrother and Partners letter confirms their understanding at the time that the site was intended to be developed for industrial use mainly covered by buildings/hardstandings. It goes on to state that as a result of the extensive testing undertaken at the site, it has been concluded that the major remediation issue was free phase oil and oil contaminated subsoil. The oil was noted to have escaped from the oil recovery system operated within the former car plant. The letter states how free phase oil has been removed from the site by a vacuum pumping process and that following uplift of these oils, they have been removed from site and disposed to a licensed facility. The letter finally notes that in order to remove the oil contaminated subsoil it has been necessary to instigate a Dig & Dump contract which was currently in progress at the time of writing.

The Environment Protection Unit response states that the Environment Agency is responsible for commenting on gas protection and contamination likely to affect water courses etc. and that the Las still retain the role of controlling remediation of contaminated sites via planning consents. It was noted from Farebrother and Partners' documentation that the EA is satisfied with their proposed strategy but the letter highlights concerns that existing ground contamination had not been assessed against the end use. It was noted that most fo the contamination was phytotoxic and so not prejudicial to health; it was stated, therefore, that if the oil contamination is removed as detailed and the site covered with buildings/hardstanding (or dense landscaping) then the Environment Protection Unit were satisfied there would be no need for any further remediation. It finished by stating that 'Once the works have been completed and the contractor has issued a certificate confirming this (or similar) the planning condition can be discharged'.

SCOPE OF REPORT

Two letters from Farebrother and Partners and Environment Protection Unit summarising remediation

CONCLUSIONS

It seems that the Environment Protection Unit are happy that discharge of the planning conditions were at least imminent/achievable although this is not conclusive at this point.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes (although this may be a no should further confirmation of remediation become available)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Geo-Environmental Ground Investigation Factual and Interpretative Report: Plot 2, The LDV Site, Wolseley Drive, Washwood Heath, Birmingham

SITE LOCATION:	Plot 2, The LDV Site, Birmingham

DATE PREPARED	November 2008	**DATE REVIEWED**	01 Feb 2013

AUTHORED BY:	White Young Green	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

The report acknowledges various investigation and reports prepared since the work undertaken by DTS/Farebrother and Partners etc. which include Phase I, ecological assessment and remediation agreement work indicating that the site is still in the process of further SI and acquisition.

The report notes that the site was 'generally level and currently used for the storage of new and used/refurbished LDV vans associated with the immediately adjacent LDV assembly plant. Plot 2 is located towards the east of the area, covering an area of approximately 1.4Ha' (see site location plan on the system file).

The scope of works (September 2007) included 3 No. continuous dynamic sample boreholes (BH4 to BH6) to a maximum depth of 6.00m bgl; and 3 No. trial pits (TP2, TP3 and TP13) to a maximum depth of 2.80m bgl.

Proven thickness of the Made Ground was between 1.20m and 4.60m. Superficial deposits comprising alluvium and sand & gravel were found to underlie the Made Ground. Solid geology comprising weathered Mercia Mudstone was encountered at depths ranging from 2.20m to 4.80m bgl.

SCOPE OF REPORT

GI Phase II Report

CONCLUSIONS
The report highlighted the following: No human health issues were identified. A number of exceedances of Environmental Quality Standard and/or Drinking Water Standard levels were identified in samples of groundwater. Risks to human health are acceptable in the context of a commercial/industrial end use. Risks are considered to be low (also considered to be low for construction workers exposed). It is considered likely that any contamination present within groundwater could migrate with groundwater flow to the north east. However, the levels of contamination identified to date are generally low. Risk is considered low. No significant contamination in terms of risk to flora and fauna was identified. A programme of groundwater monitoring is currently ongoing at the site location. Some contamination has been identified in excess of Environmental Quality Standards and/or Drinking Water Standards. On the basis of the information currently available, risk is considered moderate. Assessment of groundwater monitoring results to date has shown exceedances of EQS/DWS values for some contaminants. A possible risk to the River Tame from contaminated groundwater exists. However, it is considered likely that continued groundwater monitoring will show this risk is not significant. In order to provide sufficient information for assessment of risks to controlled waters, further monitoring of groundwater and surface water is required. A programme of monitoring is on-going. At the time of writing, land gas monitoring is ongoing at the site. The results have been assessed using the methodology set out in CIRIA C665. No special precautions for gas protection are required.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Geo-Environmental Ground Investigation Interpretative Report: The LDV Site, Wolseley Drive, Washwood Heath, Birmingham

SITE LOCATION:	The LDV Site, Birmingham

DATE PREPARED	May 2008	**DATE REVIEWED**	01 Feb 2013

AUTHORED BY:	White Young Green	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
The report details further GI undertaken in September 2007. The scope of works included 17no. continuous dynamic sample boreholes (BH1 to BH17) to a maximum depth of 8.45m bgl; 13no. trial pits (TP1 to TP13) to a maximum depth of 4.0m bgl; and14no. window sample boreholes (WS1 to WS14) to a maximum depth of 5.1m bgl. Proven thickness of the Made Ground was between 1.2m and 5.7m. Superficial deposits comprising alluvium and sand & gravel were found to underlie the Made Ground. Solid geology comprising weathered Mercia Mudstone was encountered at depths ranging from 2.20m to 6.20m bgl. Site Location/Layout/Borehole plans saved on system file.

SCOPE OF REPORT
GI Phase II Report

CONCLUSIONS
The report highlighted the following: Elevated concentrations of metals, inorganics, PAHs, TPH and Chlorinated solvents were identified in soil and/or groundwater samples. At the time of writing, land gas monitoring is ongoing at the site. The concentrations identified low to moderate levels of carbon dioxide in several boreholes across the site. The results have been assessed using the methodology set out in CIRIA C665 and equate to a land gas Characteristic Situation 2 indicating that basic gas protection measures will be required. However, this assessment is preliminary and is subject to change as more monitoring is carried out. The principal pollutant linkages identified are: Moderate to high risk to groundwater and surface water from metals, inorganics, PAHs, TPH and Chlorinated solvents in leachate and groundwater. Moderate risk to future users of the site from inhalation of vapours from groundwater. In order to quantify the potential risks identified to human health and controlled waters, Detailed Quantitative Risk Assessment (DQRA) should be carried out. Buried water supply pipes should be laid in clean service trenches, or constructed from contamination resistant materials.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Quantitative Risk Assessment Report: The LDV Site, Wolseley Drive, Washwood Heath, Birmingham

SITE LOCATION:	The LDV Site, Birmingham

DATE PREPARED	May 2008	**DATE REVIEWED**	04 Feb 2013

AUTHORED BY:	White Young Green	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

The report presents a detailed quantitative risk assessment for the site assuming a proposed end use of commercial/industrial end use.

Soil impacts are limited to the Plot 1 area of the site. Two samples from this area exceeded the TSV for naphthalene and another sample exceeded the TSV for benzene. In addition, seven samples from the site exceeded the <5,000mg/kg C5-20 TPH criteria previously agreed with the Environment Agency. Groundwaters were noted to be impacted by ammoniacal nitrogen, PAHs, TPH, benzene, vinyl chloride, cisdichlororethene and trichloroethene. The presence of chlorinated solvents in groundwater was also considered to pose a potential risk to human health.

Potential sources of contamination which may pose a risk to human health are high levels of benzene and naphthalene in soils in the Plot 1 area and chlorinated solvents in groundwater in the general site area. Groundwater was found to be impacted across much of the site area. However, the most significant concentrations of the majority of contaminants were found in two main areas, around BH2 and around BH5/BH7/BH9. High levels of TPH were identified in a total of seven soil samples. Direct contact and rainfall infiltration will be limited at the site due to the hardstanding and buildings covering much of the site. Shallow groundwater has been noted within the Made Ground and superficial deposits. Migration through the saturated zone and inhalation of vapours indoors are the principal pathways. The most sensitive human receptors are the future site users who will be commercial workers at this site. The River Tame located to the north east of the site forms the environmental receptor and has been assessed in a Controlled Waters Risk Assessment.

Site Location/Layout/Borehole plans saved on system file.

SCOPE OF REPORT

Quantitative Risk Assessment Report

CONCLUSIONS
No significant risks to human health have been identified. There is considered to be a moderate risk to development workers from impacts identified on site. Risks should be reduced through appropriate use of PPE and on site health and safety procedures. The results of the modelling undertaken for controlled waters indicate that the levels of TPH and naphthalene contamination identified in TP1 pose a significant risk to groundwater and the River Tame. No other significant risks to controlled waters have been identified. The risks posed to controlled waters from TPH and naphthalene contamination in the Plot 1 area are considered to be significant. Therefore, further investigation and/or remediation may be required. An alternative course of action for the Plot 1 area may be to either fully develop or otherwise provide complete impermeable cover over the area (eg car park). Initial modelling tests indicate that if effective infiltration could be reduced to around 5%, then the risk to the River Tame from Plot 1 would no longer be significant. Specific agreement from the Environment Agency would be required to allow this option to be implemented.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Desk Study Report: Wolseley Drive, Heartlands, Birmingham (Proposed Warehouse Extension): Parts A – D

SITE LOCATION:	UK Mail Site, Birmingham

DATE PREPARED	May 2012	**DATE REVIEWED**	04 Feb 2013

AUTHORED BY:	Harrison Geotechnical Engineering	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Desk Study prepared for Create Consulting Engineers Limited on the site to north of Wolseley Drive, Heartlands, Birmingham at National Grid reference 411341, 289521. Historically, it was a former site of industrial units, refuse heaps, historic rail workings on part of site, and recreational ground. Currently, the site is light industrial/commercial land use as the UK Mail Distribution Centre warehouse. Proposed use is to be a continuation of the current land use in the form of an extension to existing warehouse Site Location/Layout/Proposal plans saved on system file.

SCOPE OF REPORT
Phase I Desk Study

CONCLUSIONS
Potentially Contaminative Past Uses identified: Historic refuse heaps, railway sidings, previous industrial uses/ works (on site); and Various off-site industrial uses including - tanks, petroleum distribution centre, gas works, tyre manufacturer, vehicle repair, chemical works and other various industries. Deep Made Ground / fill likely (and associated potential for elevated ground gas concentrations). Recommended that an intrusive site investigation (including soil/groundwater chemical analysis and ground gas monitoring) is required to fully characterise the ground conditions at the study site and address the risks to the sensitive receptors identified from possible contamination from past site uses. The local authority should be consulted to enquire whether a site-specific flood risk assessment is required due to its close proximity to a flood risk area. Assessment of appropriate foundation type and bearing capacities for new buildings through intrusive investigation (including assessment of existing retaining wall and presence of relic below ground structures), with consideration of differential settlement. Consideration should be given to the impact of potential high groundwater, particularly on drainage. If soakaways are planned, permeability testing is advisable in accordance with the methods set out in BRE365.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Quantitative Risk Assessment Report Update (Letter Report)

SITE LOCATION:	The LDV Site, Birmingham

DATE PREPARED	18th June 2012	**DATE REVIEWED**	04 Feb 2013

AUTHORED BY:	Wardell Armstrong	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

The report presents an update to White Young Green's (WYG) quantitative risk assessment undertaken in May 2008 (see Report ref 037 'CFA26 Former LDV White Young Green 2008').

It was stated that it was understood that the report update was required in support of the renewal of an extant planning consent for industrial/storage use (classes B2 and B8) on behalf of the Langtree Group. The update is specifically for the 'Plot 1' area of the site. This was the only part of the site which was identified by WYG as posing a significant risk to controlled waters (River Tame). The letter provides the amended assessments required to bring them into line with current regulatory standards.

Groundwater samples were also obtained from existing boreholes on the site and the nearby River Tame. The purpose of this was to enable an assessment of any changes in groundwater quality over the last four years.

SCOPE OF REPORT

Quantitative Risk Assessment Report Update (Letter Report)

CONCLUSIONS

With the exception of one contaminant (cis-DCE), the results of the water monitoring showed that the groundwater conditions at the site have generally improved since the previous monitoring by WYG in 2008. Further groundwater monitoring was recommended to confirm the suspected cis-DCE anomaly. Modelling results were in broad agreement with WYG's with the soils in Plot 1 still assessed as posing a significant risk to the River Tame. WYG concluded that further investigation and/or remediation may be necessary and this remains the case. However, it was noted that it was understood that development proposals for the Plot 1 area comprise use as a car park – if this was designed to prevent infiltration as far as possible then this would greatly reduce leaching of contaminants from the soils on site. The report highlighted WYG's findings that reducing the effective rainfall to 5% of annual precipitation resulted in the soils contamination passing at Level 3 in the RTM worksheets; it noted that, as the Plot 1 area is currently unsurfaced, this could be a plausible outcome.

Modelling has shown that significant pollutant linkages between the Plot 1 area of the LDV site and the River Tame exist. Further investigation and possibly remediation is considered necessary.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Yes

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Ashted Centre, Trial Pit Logs

SITE LOCATION:	Crawford Street, Saltley

DATE PREPARED	13/11/86	**DATE REVIEWED**	07/02/13

AUTHORED BY:	Johnson Poole & Bloomer	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Factual report of trial pit logs and analysis showing elevated levels of sulphate, toluent extractable contaminants and total cyanide.

SCOPE OF REPORT
Summary of trial pits and numerous soil analyses.

CONCLUSIONS
Council record sheet states that accompanying letter proposed that surface scrape of the site should be undertaken and buried structures and tanks excavated. Spent oxide ("Blue Billy") was also removed. Estimated that 7000m3 removed. The site was capped with 2m of inert material. Letter on file also states that 0.15m layer of marl/clay was used as a clean capping layer across the site.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low to Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Ground Investigation at British Gas

SITE LOCATION:	British Gas, Saltley

DATE PREPARED	October 1988	**DATE REVIEWED**	07/02/13

AUTHORED BY:	Ground Investigation and Piling Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Factual geotechnical site investigation report.

SCOPE OF REPORT
Eight boreholes to supplement the preliminary SI earlier that year. SPT testing. Disturbed and undisturbed samples for testing

CONCLUSIONS
Fill, Fluvio-glacial, Marl, Bedrock. Contamination odour notes all the way to bedrock (discussed further in separate report). Groundwater level 1.25 – 5.0m bgl

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Contamination Investigation, Factual Report on Site Investigation

SITE LOCATION:	British Gas, Crawford Street

DATE PREPARED	March 1995	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Foundation and Exploration Services	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Geotechnical and geoenvironmental site investigation to identify the concentrations and distribution of contaminants. Factual report for Ove Arup and Partners.

SCOPE OF REPORT
17 boreholes to between 0.6 and 30.0m depth and 20 trial pits to between 0.6 and 3.7m depth. Piezometers installed in 9 boreholes and dual piezometers installed in 2 boreholes. Geotechnical testing, and soil and groundwater samples analysed for heavy metals, cyanide, phenols, sulphide, ammonia, chloride, nitrate, sulphate, coal tars, PAH, COD and BOD.

CONCLUSIONS
Factual report – no conclusions made.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Qualitative Risk Assessment Along the Tow Path Adjacent to Crawford Street

SITE LOCATION:	British Gas, Crawford Street

DATE PREPARED	October 1997	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Ove Arup & Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Qualitative risk assessment of tarry substance found in the pipe in the tow path of the Grand Union Canal adjacent to British Gas site.

SCOPE OF REPORT
Risk assessment using geological and hydrogeological information from adjacent site undertaken in recent years.

CONCLUSIONS
Risk of tar reaching aquifers, canal or surfacing to affect the public is low. No evidence of it having occurred in the past and with tow path improvement works and reclamation of gas works risk should be even lower. Likelihood of encountering the tar during tow path excavation is high, but by adopting usual HSE precautions the risk to construction workers will be low.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Site History, Geology, Contamination Report and Reclamation Strategy

SITE LOCATION:	British Gas, Crawford Street, Saltley

DATE PREPARED	April 1997	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Ove Arup & Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Strategy for reclamation of gasworks. Includes interpretation of results of other SI reports (FES, 1995 and FES, 1997).

SCOPE OF REPORT

FES, 1995 (ref. 50):
17 boreholes to between 0.6 and 30.0m depth and 20 trial pits to between 0.6 and 3.7m depth. Piezometers installed in 9 boreholes and dual piezometers installed in 2 boreholes. Geotechnical testing and soil and groundwater samples analysed for heavy metals, cyanide, phenols, sulphur, sulphide, ammonia, chloride, nitrate, sulphate, thiocyanate, TDS, mineral oils, alkalinity, bicarbonate alkalinity, coal tars, pH, PAH, COD and BOD. Permeability testing. Ground gas monitoring.

FES, 1997:
Nine boreholes and 20 trial pits to between 1.0 and 4.5m bgl. Monitoring wells/piezometers installed in four of the boreholes. 17 soil and groundwater samples tested for heavy metals, sulphur, sulphate, nitrate, ammonia, pH, cyanide, thiocyanate, coal tars, SEM, PCBs, coal tar, TPH, PAH and phenols.

CONCLUSIONS

Made Ground to 9.4m bgl max.
Alluvium 1.0 to 3.9m depth (0 to 3m thick)
Fluvioglacial deposits (0.5 to 26.4m thick)
Mercia Mudstone
Sherwood Sandstone From 29.65m depth

2 groundwater tables – upper unconfined in alluvium/fluvioglacial (91.5 to 94.5m aOD) and confined in sandstone (84.9 to 86.4m aOD)

Elevated soil PAH, phenols, cyanide, coal tars, Cu, Ni, Zi, As, Cd, Cr, Pb, Hg, and Se. Hotspots of significant contamination identified including blue billy, cyanide, sulphate, coal tars, and PAH. Soil contamination predominantly in upper layers but some does exist in deep strata.

Underground fuel storage tanks identified.

Elevated water PAH, ammonia, cyanide, sulphide and sulphate.

Ground gas not present in significant concentrations.

Recommendations:
Contamination concluded to be generally low but some contamination of Sherwood Sandstone and surface water may be occurring and high levels of contamination in upper soil layers. Recommend removing contamination hotspots and capping site with impermeable layer.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (assuming hotspots removed and site capped)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Reclamation of Saltley Gas Works, Phase II, Final Report

SITE LOCATION:	British Gas, Crawford Street, Saltley

DATE PREPARED	October 1988	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Ecotec Research and Consulting Ltd	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Phase II SI to determine presence and extent of underground structures and contamination associated with the gasworks.

SCOPE OF REPORT
41 sampling locations arranged in an approximate grid (some trenches, trial pits and boreholes), 8 geotechnical boreholes drilled by GIP (see GIP, 1988 ref 46). 37 soil samples and 6 groundwater samples tested for pH, sulphate, cyanide, phenol, TEM, coal tar, As, Cd, S, sulphide, Cu, Ni, Zn, ammonium and chloride.

CONCLUSIONS
Identified cluster of brick-built gas holders, intact coke-screening plant, below-ground waste filled voids, and extensive concrete. Majority of site is free of severe contamination however elevated levels of all contaminants were present within the made ground beneath/within former gas holders. High soil sulphate across the site. Waste-filled voids show elevated As, S and hydrocarbons. Recommend excavation and removal on contaminated land whilst removing underground structures, esp. around gas holders, and employ suitable capping measures.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low to Moderate (depending on extent of remedial measures undertaken)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	'High' Priority Site Boundary Survey

SITE LOCATION:	British Gas, Duddeston Mill Road, Saltley

DATE PREPARED	January 1994	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Scientific Services Department, British Gas	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Factual report presenting soil and groundwater testing results of samples taken from the boundary of the Saltley Gas Works at Duddeston Mill Road.

SCOPE OF REPORT
218 soil samples and 24 water samples. Tested for PAH, phenols, cyanide, chloride, sulphate, sulphur, pH, heavy metals,

CONCLUSIONS
Factual report – no conclusions made.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Site History, Geology, Contamination Report and Reclamation Strategy

SITE LOCATION:	British Gas, Crawford Street, Saltley

DATE PREPARED	May 1995	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Ove Arup & Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Outline strategy for reclamation of former Saltley Gas Works following general site clearance.

SCOPE OF REPORT

Desk study

GI (see FES, 1995 ref. 50) - 17 boreholes to between 0.6 and 30.0m depth and 20 trial pits to between 0.6 and 3.7m depth. Piezometers installed in 9 boreholes and dual piezometers installed in 2 boreholes. Geotechnical testing and soil and groundwater samples analysed for heavy metals, cyanide, phenols, sulphur, sulphide, ammonia, chloride, nitrate, sulphate, thiocyanate, TDS, mineral oils, alkalinity, bicarbonate alkalinity, coal tars, pH, PAH, COD and BOD. Permeability testing. Ground gas monitoring.

CONCLUSIONS

Made Ground to 9.4m bgl max.
Alluvium 1.0 to 3.9m depth (0 to 3m thick)
Fluvioglacial deposits (0.5 to 26.4m thick)
Mercia Mudstone
Sherwood Sandstone From 29.65m depth

2 groundwater tables – upper unconfined in alluvium/fluvioglacial (91.5 to 94.5m aOD) and confined in sandstone (84.9 to 86.4m aOD)

Elevated soil PAH, phenols, cyanide, coal tars, Cu, Ni, Zi, As, Cd, Cr, Pb, Hg, and Se. Hotspots of significant contamination identified including blue billy, cyanide, sulphate, coal tars, and PAH. Soil contamination predominantly in upper layers but some does exist in deep strata. Particularly found in 5 hotspots.

Elevated water PAH, ammonia, cyanide, sulphide and sulphate.

Ground gas not present in significant concentrations.

Recommendations:

Contamination concluded to be generally low but some contamination of Sherwood Sandstone and surface water may be occurring and high levels of contamination in upper soil layers. Recommend removing contamination hotspots and

capping site with impermeable layer such as hardstanding.

Planning permission was also obtained for a landscaped bund was constructed along the northern boundary with the rail lines.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (assuming hotspots removed and site capped)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Final Report on the Off-Site Highway and Environmental Issues

SITE LOCATION:	British Gas, Crawford Street, Saltley

DATE PREPARED	January 1995	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Ove Arup & Partners	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Discusses the proposed off-site highway designs and environmental issues associated with the redevelopment of the Saltley Gas Works.

SCOPE OF REPORT
Condition assessments of the highway and canal bridge and discussion of proposed access road design and construction.

CONCLUSIONS
None

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	N/A

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Reclamation of Saltley Gas Works

SITE LOCATION:	British Gas, Crawford Street, Saltley

DATE PREPARED	July 1988	**DATE REVIEWED**	08/02/13

AUTHORED BY:	Ecotec Research and Consulting Ltd	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Site investigation and reclamation recommendations for the redevelopment of Saltley Gas Works.

SCOPE OF REPORT
Drilling by GIP (GIP, 1988 ref. 46) and sampling, geotechnical testing, limited soil geoenvironmental analysis and BRE testing of groundwater. Reclamation options and appraisal.

CONCLUSIONS
Extensive underground structures present. Elevated cyanide and coal tar in soils. Recommend either removal of all made ground to a depth of 4m and replacement with 'clean' material OR improvement of ground conditions beneath proposed buildings without addressing contamination.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low to High (depending on extent of contamination and remedial option undertaken)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	LDV Site, Wolseley Drive, Washwood Heath, Birmingham: TPH Remediation Works Validation Report

SITE LOCATION:	LDV Site, Wolseley Drive, Washwood Heath, Birmingham

DATE PREPARED	February 2005	**DATE REVIEWED**	12/03/13

AUTHORED BY:	Halcrow Group Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
TPH Remediation Works Validation Report – supplemented by a series of letters between December 2003 and July 2005 (some of which appended in main report) including groundwater risk assessment/tender documents for remedial works as well as a cover letter dated 15/02/2005 and post-report letters. Halcrow was appointed by St Mowden Developments limited on 7th September 2003 in relation to further investigation, remedial works and validation at the Former LDV site. A site action criteria (SAC) for remediation of 5000 mg/kg TPH content in the range C5 – C20 was defined and three distinct areas (A, B and C) were targeted for remediation against the SAC. Investigations carried out outside of these areas in December 2003 identified no petroleum hydrocarbon sources/pathways which would be likely to re-contaminate Areas A – C. Remedial works were undertaken between September and December 2004. MG was excavated, tested and treated as appropriate prior to backfill (none disposed off-site). Samples of the natural alluvium were analysed to validate that all necessary remediation undertaken. It was ensured that all Areas were pumped dry during excavation works and an on-site treatment plant was used to filter and remove any hydrocarbons from the water, with treated water being discharged into the on site foul sewer under permit from Severn Trent Water.

SCOPE OF REPORT
Remediation Works Validation.

CONCLUSIONS
With regards to the supplementary letters detailing groundwater advice, Halcrow stated in a letter to the EA (02/09/2004) that their modelling (revised based on meetings) showed that Tier 3 theoretical groundwater concentration sat the River Tame (compliance point) for the proposed site remedial target of 5000 mg/kg TPH do not exceed the Water Supply (Water Quality) Regulations value of 0.01 mg/l for TPH (accepted by the EA in a letter response dated 17/09/2004, albeit with extra points to be noted). This is the case for remediation of TPH both in the range C5 to C35 and the range C5 to C20 only. The works proposed are to remediate TPH in the range C5 to C20 to 5000 mg/kg or less with removal of any free phase LNAPL to a maximum thickness of 2mm followed by groundwater monitoring for a minimum of six months to ensure no rebound. Halcrow stated that they would please to receive approval of their calculations which in their opinion showed that the proposed works do not constitute an unacceptable risk to the River Tame. With regards to the validation report, backfilled material to the three areas was sampled and validated to be below the SAC. Visual inspection of the excavations identified no suggestion of the presence of potential pathways. Samples were taken from the wall excavations and testing showed all but one (in Area C, only marginally above at 5400 mg/kg) to be below SAC. The cover letter sent with the report (dated 15/02/2005) stated that if this was of concern to LDV, then Halcrow would propose window sampling/testing in this area to define the extent and then agree appropriate action) Sample results from the alluvium beneath each area were below the SAC. Monitoring BHs were installed in each Area and the reports stated that groundwater level monitoring and sampling would be undertaken for a minimum of six months to demonstrate that any free phase petroleum hydrocarbons floating on the groundwater have been removed to no more than 2 mm and that no rebound has occurred. During excavation in Area A, suspected ACMs were encountered within MG. Laboratory testing confirmed asbestos in some samples tested. The excavation was kept damp to ensure no fibres released to air. A specialist asbestos removal company removed the ACMs from Area A (total volume excavated and inspected for ACMs was 2126 m^3). A consignment note is included in the report together with a letter from the specialist company stating that all asbestos debris within the soil had been removed as far as was practically possible. Further letter correspondence from the EA (30/03/2005) confirmed that, having reviewed the report, it appeared remedial targets had been met and agrees that validation works are satisfactory subject to completion of monitoring. Further letter correspondence (June and July 2005) is available between BWB Consulting and the Environmental Protection Unit at BCC in relation to views on the status of the land in respect Part IIA of the EPA 1990 and the possibility of the land being subject of detailed inspection. Confirmed that would need preliminary screening assessment and investigation of other contaminants aside from TPH/asbestos. Unlikely to need further detailed assessment in respect to controlled waters. It was understood at the time that the land was to be used for the parking/storing of vehicles (disturbance will be minimal) hence was confirmed that it would be unlikely the land would be contaminated land with respect to asbestos within the meaning of Part IIA (need to be reviewed if land use were to change).

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low / Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Royal College of Organists, Geo-Environmental Interpretative Report

SITE LOCATION:	Curzon Street

DATE PREPARED	October 2003	**DATE REVIEWED**	27/03/13

AUTHORED BY:	Faber Maunsell	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Interpretation of results of ground investigation carried out on proposed site of recital hall for Royal College of Organists at Curzon Street, Birmingham.

SCOPE OF REPORT
4 trial pits, 2 boreholes to 12.5m bgl installed with piezometers. SPTs undertaken. 2 gas and groundwater monitoring visits including permeability test. Soil samples tested for pH, SO4, sulphide, sulphur, phenols, cyanide, PAH, and heavy metals. Leachate tested. Groundwater samples tested for pH, SO4, sulphide, sulphur, cyanide, heavy metals, phenols, PAH and TPH.

CONCLUSIONS
Historical basement identified at 3.6m bgl. Made Ground to 4.5m bgl max. Bromsgrove Sandstone from 3.85m bgl min. Groundwater level ~4.5m bgl (~105m aOD) No methane, CO2 up to 2.2% v/v Ammonia and mercury detected in leachate above threshold. Sulphide and TPH detected in GW above threshold. No remediation but further gas monitoring recommended.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Freightliner Depot, Further Site Investigation

SITE LOCATION:	Landor Street, Birmingham

DATE PREPARED	August 2004	**DATE REVIEWED**	27/03/13

AUTHORED BY:	URS	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Additional SI to supplement previous data assessing the potential off-site migration of site derived contamination at a large freight terminal (and former gas works) in Birmingham city centre.

SCOPE OF REPORT

5 boreholes in area 2 (to 7m), 5 boreholes in area 4 (to 7m), and 6 boreholes in areas 6 and 7 (to 7m). All installed with monitoring wells.

Soil samples tested for TPH, BTEX, and PAH. Leachate was tested for PAH and TPH. Groundwater samples tested for TPH, BTEX, PAH, iron, manganese, nitrate and sulphate.

CONCLUSIONS

Made Ground to 4.8m max.
Patchy drift
Mercia Mudstone 4.7 to 6.5m

Groundwater ~96-97m aOD

Area 2 - 1-10mm product, TPH, BTEX, and PAH were detected above threshold limits table and smear zone with no apparent historical source and likely off-site source. – recommend monitoring

Area 4 – 1-443mm product, free phase petroleum hydrocarbons, mid to heavy range associated with former gas works – recommend monitoring and proactive product removal

Area 6&7 – no significant issues – no action recommended

Simulated risk to River Rea above DWS/EQS with travel times of 700 years.

Recommend regular monitoring

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Groundwater Remediation and Moniitoring, Birmingham Freightliner Terminal

SITE LOCATION:	Landor Street, Birmingham

DATE PREPARED	August 2006	**DATE REVIEWED**	27/03/13

AUTHORED BY:	Atkins	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Summary of current site conditions and recommendations for future actions at freight terminal (and former gas works).

SCOPE OF REPORT
Monitoring of boreholes installed during previous SI inc baildown tests. Remedial recommendations made.

CONCLUSIONS
Findings from previous SI confirmed. Recommend remediation of areas 2 and 4 by removing product via hand bailer/ORC/auto-skimming system.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate to Low (depending on remediation)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Factual and Interpretative Report on Ground Investigation

SITE LOCATION:	Eastside, Curzon Street, Birmingham

DATE PREPARED	February 2006	**DATE REVIEWED**	27/03/13

AUTHORED BY:	White Young Green	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Site investigation of site consisting predominantly of small industrial premises prior to redevelopment to four uses including as large recreational park.

SCOPE OF REPORT
70 boreholes, gas and groundwater monitoring and chemical analyses.

CONCLUSIONS
Phototoxic metals identified therefore capping required in landscaped areas. No HH risks. No gas protection required unless confined space. PAH detected at risk levels in leachate – further investigation recommended to constrain location

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Contamination Investigation on Birmingham and Warwick Canal Towpath

SITE LOCATION:	Nr Addeley Road, Saltley

DATE PREPARED	July 1997	**DATE REVIEWED**	27/03/13

AUTHORED BY:	Industrial Research Laboratories	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT
Presents findings of assessment of the presence of potentially harmful substances during a towpath renovation scheme.

SCOPE OF REPORT
Chemical testing of samples recovered during towpath renovation scheme.

CONCLUSIONS
"Blue Billy" observed in backfilled service trench, ash fill possibly contaminated with tar observed in retaining wall, contaminated sludge found remaining in pipework. Chemical analyses confirmed presence of tar (24% of total content of pipe sludge) containing v high levels of PAH many of which are known carcinogens. Phenols also found in pipe sludge. Concluded that detailed contamination assessment should have taken place prior to renovation work due to level of contamination already known. Likelihood of highly contaminated pipe sludge to leach to canal so should be removed whereby it poses risk to HH to site workers. "Blue Billy" already scheduled to be removed but recommend sealing off from public in the meantime.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	High (current state) Low (if recommended removal undertaken)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	N/A – Various letter correspondence between BWB and BCC

SITE LOCATION:	Network Park (Old Saltley Gasworks), Birmingham

DATE PREPARED	2001	**DATE REVIEWED**	04/04/13 – 05/04/13

AUTHORED BY:	Various	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Folder (entitled 'SI 407 Network Park, Old Saltley Gasworks') comprising various correspondence between BWB/BCC/CRCL relating to contaminated land constraints (mainly gas issues) to the development of Network Park (Old Saltley Gasworks) in Birmingham. The monitoring data appended appears to suggest elevated methane is the issue (up to 46% v/v in one case). BWB proposed repairs to the gas membrane covering the site at the time to maintain appropriate protection measure.

SCOPE OF REPORT

Various letter correspondence between BWB/BCC/CRCL relating to contaminated land constraints (mainly gas issues) to the development of Network Park (Old Saltley Gasworks) in Birmingham.

CONCLUSIONS

Levels of oxygen and carbon dioxide not consistent with landfill gas. Lab testing and monitoring of the gas in January 2001 shows 'Calor' type gas is present and that no flow was detected. It was therefore proposed to continue with the designed gas protection system, comprising an impermeable membrane beneath the ground bearing slab (this was only minimal protection based on the low concentrations and insignificant flow rates). Fax/E-mail correspondence from Kevin Royal (Contaminated Land Team Leader at the Environmental Protection Unit BCC) dated 8th February 2001 (confirmed later by letter dated 11th April 2001) confirmed that he raises no objection to BWB's proposal to install gas membranes to the foundations of the buildings to deal with gas problem identified subject to the installation conforming with the requirements of the building inspector.

Separate notes include notes of conversations regarding TNT's proposed move to the north of the site; they wanted to know if 'we' (assume BCC?) were satisfied that there was no contamination risk. Notes state that on 20/02/2003, discharged Condition B10 (soil survey, gas monitoring & remediation) in relation to the whole site from Saltley viaduct to Duddeston Mill Road. Gas protection scheme agreed with BWB and B10 agreed to discharge since scheme was approved and subject to 500 mm on landscaped areas. On 08/04/2003 it is noted that planning have now spilt the site into northern/southern half and it was stressed that if separate developments then any development needs to have regard to site works already carried out and the discharge being subject to gas protection measures being implemented. No validation report received to say what remediation completed. On 09/042003, notes state that George Laird (CRCL – TNT Property Agent) has spoken to Easter Developments and has documentation to confirm remediation carried out. Site soil removed to depth of 1.5 m (entire site) *(this '1.5 m remediated level' is indirectly confirmed in a separate letter from BWB dated 12/02/2001)* and includes construction of impermeable membrane at 0.5 m. Notes indicate that satisfied that the site work and remediation would meet the requirements for protection of the buildings. Work on site began in late 1980s – numerous investigation reports and remediation schemes but hold no validation reports detailing extent of the works carried out; previous remediation may not be up to date with current

standards. Evidence from Arup & BWB (2000 / 2001) suggest near surface contamination issues have been dealt with and pose no risk to the development specified in Oct 2000 and gas issues to be dealt with through a gas protection scheme approved by BCC. Notes state significance of whether the proposals had changed or not since being agreed under PA in 2000 (i.e. if designs or remediation is different, it hasn't been agreed). Cannot be sure that there is no contamination at depth, which will not pose a risk to site/controlled waters. If capping is placed on site and then this is destroyed by future development the buildings not necessarily protected.

Other subsequent correspondence includes a Fax from George Laird (CRCL) dated 17th April 2003 detailing that, at TNT's expense, Easter Developments applied for and received a planning permission to develop the remaining undeveloped part of Network Park (indicates the rest of Network Park already developed by this point in association with a planning permission granted in 2001). The fax seeks to clarify the understanding that Arups were appointed by British Gas in 1998 to act as remediation engineers for the site as a whole. It highlights (and appends) an agreed remediation strategy which included the removal of contamination sources, other material from the top 1.5 m where action levels exceeded, all structures within 1.5 m and subsequent compaction of the top 1.5 m to provide a working platform (including verification testing), in addition to laying an impermeable gas membrane (2000 gauge thick polythene) at a depth of 0.75 m site-wide to prevent surface water from penetrating contaminated material below. Where the membrane was punctured as part of the works it was reinstated with a membrane of identical gauge with a 0.5 m overlap. (*The appended remediation strategy is included on the system in the 'Drawings referenced in reviews'*). The fax seeks clarity on whether the remediation works extend to the whole of Network Park and that condition B10 has been satisfactorily discharged (by BCC and EA) for the whole site (including TNT). BCC's response (dated 29th April 2003) highlights that numerous SIs dating back to 1986 are held for the site and that the original 1986 report and associated correspondence indicate a surface scrape of the site was undertaken to reveal and remove buried structures and tanks along with visibly contaminated material and that the site was capped to a depth of 2 m with inert material. BCC confirm that they also hold numerous Arup reports from between 1995 and 1998 and that BCC understand Arup carried out investigations and remediation across the whole site including the proposed TNT site. From info available *(remediation strategy excerpt on system)* BCC confirm that it would seem that this remediation was carried out. BCC confirm that it is their understanding that above the membrane barrier, the material on site would be suitable for commercial/industrial buildings with hardstanding areas. They note however that, as far as BCC are aware, no SI or risk assessment of the ground at depth has been undertaken, therefore some residual contamination may still remain below the membrane. Any new development on site needs to consider this membrane and not compromise its integrity. Any puncture should be reinstated. BCC noted that hopefully a similar scheme to the Phase I development (i.e. reinstating with a membrane of identical gauge with a 0.5 m overlap) would be applied on the TNT site, in which case BCC confirmed they would be satisfied that the site would be fit for use.

A BCC SI database search summary is included on system (in 'Drawings referenced in reviews' folder). These summaries generally highlight various contamination/gas issues and recommendations typically include existing fill/source/structure removal (up to 3 m depth recommended in one report from 1988) and replacement with clean, with verification tests. The last SI reference number on this summary ('SI 407') matches with the reference number on the front of the main folder summarised as part of this Word document.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low – assuming barrier remains integrity, although note that risk from any contamination at depth (below barrier) and any effect that this may have/be having (i.e. on groundwater) does not seem to have been determined.

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Intrusive Investigation Works at Former Windsor Street Facility

SITE LOCATION:	Former Windsor Street Facility, Birmingham

DATE PREPARED	March 2009	**DATE REVIEWED**	16/05/13

AUTHORED BY:	URS Corporation Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

The report presents the findings, conclusions and recommendations of the intrusive investigation undertaken at the former Windsor Street Gas Works site, Birmingham, West Midlands, UK ("the site"). The report was prepared by URS on behalf of the Environment Agency (EA) in accordance with URS' proposal reference R01003/49327901 Rev2 dated 27 November 2007. The report followed a start up meeting between the Environment Agency and URS on 18 June 2008, final factual report R1060/49327936-3040/LB/LS/Final Rev1 issued on 24 October 2008 and a review meeting between URS the Agency on 26 September 2008. The investigation is designed to be in accordance with paragraph B20 (c) of the statutory guidance DETR Circular 02/2000, in order to:

a) Determine whether the land appears to be Contaminated Land, in accordance with the statutory guidance, and

b) Decide whether the land falls within the definition of a Special Site.

URS stated in their tender documentation that they understood that Birmingham City Council (BCC) had requested that the EA undertake a detailed inspection of the Former Windsor Street Gasworks (the site) in accordance with Part IIA of the Environmental Protection Act (EPA) 1990. The former Windsor Street Gasworks is located at Windsor Street, Aston, approximately 2 km to the northeast of Birmingham city centre.

The report represents the most recent final interpretative report which could be traced (rev 1e)

SCOPE OF REPORT

Intrusive Investigation Works at Former Windsor Street Facility.

CONCLUSIONS

Based on the available data, elevated concentrations of TPH and PAH were detected in made ground and alluvium and appeared to be associated with the locations of former tanks. Metals were detected in soil in both the made ground and underlying alluvium in each of the areas investigated. Concentrations of PCB were also detected in shallow soil in Area B. The key source areas of soil contamination were identified in following areas:

• Area C: elevated concentrations of TPH and PAH detected, with localised hotspot identified in WS121 and WS122 corresponding to the location of former tanks;

• Area F: elevated concentrations of TPH and PAH in WS117 and WS115; and

• Area G: concentrations of TPH and PAH with the maximum concentration being detected in WS126, in the area of a former tank.

With respect to risks to human health, exceedances in the screening criteria are considered to be isolated in nature occurring in “hotspots” and suggests that based on exposure to such substances averaged over the total area, that a significant possibility of significant harm meeting the conditions in Table B of Defra Circular 01/2006 does not exists at the site with respect to unacceptable harm to humans.

Based on the above, compounds detected in the shallow soil or groundwater beneath the site with a hazard index of greater than one are considered to represent a potential risk to Controlled Waters and as such a significant pollutant linkage is likely to be present.

Based on the investigation works undertaken to date, given the simulated risks at the top of the saturated zone from the detected soil concentrations, it can be concluded that there is a theoretical risk of pollution of controlled in Areas A, B, C, D, F, G and J. Risks simulated from soil sources are conservative, nevertheless they indicate that the pollutant linkage (source–pathway-receptor) is present, comprising contaminants in the shallow soils vertically leaching through the unsaturated zone in Areas A, B, C, D, F, G and J and laterally migrating through saturated pathway to down hydraulic gradient to the 50 m compliance point in Areas C and G. On this basis, it is therefore considered that the site meets the statutory definition of Contaminated Land and could be determined as such.

Pollutants listed in paragraph 1 of Schedule 1 of the Contaminated Land (England) Regulations 2006 which possess carcinogenic, mutagenic or teratogenic properties in or via the aquatic environment, were detected in the soil the site beneath in Areas A, B, C, D, F, G and J and simulate a risk at the top of the unsaturated zone. Therefore, should the site be determined as Contaminated Land, it would also meet the criteria to warrant designation under Regulation 3(c) of the Contaminated Land (England) Regulations 2006 as a ‘Special Site’.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	European Metal Recycling Ltd. Landor Street Extension (Saltley Depot) Environmental Assessment Report (Ref. 71619 rev.1)

SITE LOCATION:	Landor Street Extension (Saltley Depot)

DATE PREPARED	January 2010	**DATE REVIEWED**	04/06/13

AUTHORED BY:	Mayer Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Mayer Environmental Ltd. (MEL) was commissioned by European Metal Recycling Ltd. (EMR) to undertake additional intrusive site works at the former Saltley Depot, the site proposed for the Landor Street extension. The works were undertaken in response to comments from the regulators who requested further information to ensure adequate site characterisation as more information on risk to controlled waters. Three previous reports exist (Weeks Consulting in 1998 and MEL in 2008 and 2009). The purpose of the investigation was to provide additional information on potential contamination that may exist.

The site was previously owned and operated by English, Welsh and Scottish Railways (EWS), and was used as a maintenance, refuelling and crew depot. At the time of writing it was disused and owned by EMW. A building located to the west was used as a maintenance shed and has now been demolished. Parts of the railway lines have also been removed. It was noted that a compound of bunded fuel tanks was present in the south west corner which is presumably fed via an underground pipe from a fuel entry point noted on the eastern boundary. No visual evidence of any significant spills or leakages were noted during an inspection of the bunds during the works. Proposals were to develop the site as an extension to eth existing adjacent EMR facility (concrete paving cover and new buildings for storage/office use).

Soil and groundwater testing undertaken by Weeks (1998) (6 no. rotary boreholes and 14 no. hand portable WS rig) indicated that the southern and eastern part of the site was contaminated with hydrocarbons, predominantly within BH2. The MEL 2008 contained an updated desk study and focussed on the area around Weeks BH2 with the aim of delineating the contaminated area by the undertaking of 10 no. CP boreholes to a max depth of 8.0 m bgl. Generally fill (max depth 4.5 m bgl) overlying alluvial clay layer, over glaciofluvial sands and gravels over MMG; perched groundwater was encountered in the fill and visual and olfactory evidence of hydrocarbon contamination was noted in the majority of locations predominantly in the fill. The 2009 MEL report concentrated on the area of the bunded tanks and the western site boundary. GI comprised 6 no. WS boreholes (max depth 4.6 m bgl); visual and olfactory evidence of hydrocarbon contamination was noted in many locations.

This report summarises additional GI comprising of two phases of investigation undertaken – a geotechnical phase (7 no. CP boreholes along proposed fence line at eastern boundary; these were not chemically tested but were monitored for free product) and an environmental phase (8 no. CP boreholes, located to target the area close to the bunded tanks, the western boundary ad the northern part of the site; investigated to max depth 7.2 m bgl).

SCOPE OF REPORT

Environmental Assessment Report.

CONCLUSIONS
Data from both this and previous investigations could suggest that two areas of hydrocarbon contamination (both dissolved and free phase) are present – one within the perched groundwater in the fill materials on the eastern side of the site (source considered to be spillages/leakages from historic land use) and one within the groundwater in the sands and gravels in the areas of BHF and BHG (source not clear – potentially migrated from the perched groundwater in east in absence of alluvial clays in this area, but low permeability rates suggest an alternative that historic spillages/leakages may have impacted directly). Area 1 incorporates the contamination plume in the perched groundwater in the fill on the eastern side and in the central area of the site; Area 2 incorporates the plume located within the groundwater in the sands and gravels in the area of BHF and BHG (assumes source is from historical sills/leakages). With regards to Area 1, and potential impact on the underlying aquifer and subsequently the river, P20 assessment did not identify any significant dissolved phase hydrocarbon fraction concentrations. Within the sands and gravels, one sample from BHA displayed a concentration within Aromatic C16-C21 slightly above the calculated target value indicating that the gravels in this location could potentially pose a risk to the Rover Rea. However, overall all other samples analysed in the gravels in this areas did not identify this fraction above the level of detection. In addition, target values are considered conservative (e.g. the 25% infiltration rate would be closer to zero once concrete covered, BHA is greater than the 100 m compliance point used) so the concentration identified in BHA is not considered to pose a significant risk to the River Rea. The soil concentrations identified in the samples analysed in Area 2 were all below the calculated target values and therefore are not considered to pose a significant risk to the River Rea. Within Area 1, the P20 assessment identified that the concentrations within a small number of hydrocarbon fractions within the perched groundwater in BHC may potentially pose a risk to the River Rea (however, as with the soils assessment, a number of conservative parameters were used in the assessment). Within Area 2 elevated hydrocarbons when compared to the target values were identified within the groundwater in the sands and gravels at BHF and BHG. This indicates that the groundwater could potentially pose a risk to the River Rea. However, it should be noted that the target values calculated are considered conservative. Regardless, it should be noted that the P20 does not consider the issue of free product within the assessment, which was recorded in several locations (max thickness 35 cm in MEL BH1) and is likely to be the most significant issue. The report concluded by indicating that a detailed remedial plan would be formulated once comments on the report were received. It was recommended focus should be given to the removal of the free product. It highlights that the proposed whole site concrete cover will break the direct contact/ingestion route for human health and also reduce further contamination from the surface impacting the ground. The P20 assessment suggested that hydrocarbon levels in the soils do not pose a risk to the target controlled water and that, in general, the dissolved hydrocarbons identified in perched groundwater do not pose a significant risk to the target controlled water. Therefore, it is proposed to use the wide diameter boreholes and/or trenches at the eastern boundary where contamination is most significant. In the sands and gravels groundwater plume, from which a risk is concluded, the extent of contamination is thought to be relatively small and so it is proposed to use boreholes rather than a trench to treat the groundwater. Proposed to use mixture of current boreholes and sink new boreholes and to monitor regularly throughout the works.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	High (as risks found but no evidence of remediation at time of writing)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	European Metal Recycling Ltd. Landor Street Extension (Saltley Depot) Environmental Assessment Report (Ref. 71619 rev.1)

SITE LOCATION:	Landor Street Extension (Saltley Depot)

DATE PREPARED	September 2009	**DATE REVIEWED**	05/06/13

AUTHORED BY:	Mayer Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

See Ref. 072 for subsequent 2010 report review

Mayer Environmental Ltd. (MEL) was commissioned by European Metal Recycling Ltd. (EMR) to undertake additional intrusive site works at the former Saltley Depot, the site proposed for the Landor Street extension. Two previous reports exist (Weeks Consulting in 1998 and MEL in 2008 and 2009). The purpose of the investigation was to provide additional information on potential contamination that may exist.

The site was previously owned and operated by English, Welsh and Scottish Railways (EWS), and was used as a maintenance, refuelling and crew depot. At the time of writing it was disused and owned by EMW. A building located to the west was used as a maintenance shed and has now been demolished. A small number of the railway sidings have also been removed. It was noted that a compound of bunded fuel tanks was present in the south west corner which is presumably fed via an underground pipe from a fuel entry point noted on the eastern boundary. No visual evidence of any significant spills or leakages were noted during an inspection of the bunds during the works. Proposals were to develop the site as an extension to eth existing adjacent EMR facility (concrete paving cover and new buildings for storage/office use).

Soil and groundwater testing undertaken by Weeks (1998) (6 no. rotary boreholes and 14 no. hand portable WS rig) indicated that the southern part of the site was contaminated with hydrocarbons, predominantly within BH2. The MEL 2008 contained an updated desk study and focussed on the area around Weeks BH2 with the aim of delineating the contaminated area by the undertaking of 10 no. CP boreholes to a max depth of 8.0 m bgl. Generally fill (max depth 4.5 m bgl) overlying alluvial clay layer, over glaciofluvial sands and gravels over MMG; perched groundwater was encountered in the fill and visual and olfactory evidence of hydrocarbon contamination was noted in the majority of locations predominantly in the fill. Soil/groundwater analysis identified elevated petroleum hydrocarbons in the fill, whilst free product was identified in the majority of locations. Groundwater sampled from the glaciofluvial deposits displayed trace levels of hydrocarbons.

This report focussed on the area around tanks and the western boundary of the site. GI comprised 6 no. WS boreholes (max depth 4.6 m bgl).

A letter loosely attached to the front of the report dated 7th October from Meyer Environmental to Paul Burns (BCC) confirms that the planning application for the site has been approved subject to conditions and asking for confirmation that the conditions '1.1) Preliminary Risk Assessment' and '1.2) Site Investigation Scheme' have been fulfilled. The letter notes that a Remedial Method Statement will follow in due course to satisfy Condition 1.3.

SCOPE OF REPORT

Environmental Assessment Report.

CONCLUSIONS
Focussed on two areas of the site: • The area around the tanks – visual and olfactory evidence of hydrocarbon contamination noted in all three locations in the fill materials and sands and gravels; • The area along the western boundary – visual and olfactory evidence of hydrocarbon contamination noted in all three locations, being in the form of a diesel and water seepage directly underneath the ballast in one instance. The levels of hydrocarbons detected within the soil samples would not be considered significant with regards to human health and a commercial or industrial end-use. The groundwater sampled from the glaciofluvial deposits showed low levels of mid to heavy end range hydrocarbon fractions. P20 assessment undertaken to assess risk to River Rea; soil concentrations in the majority of hydrocarbons fractions were all below target values except for aromatic C12-C16 and aromatic C16-C21. However when fill materials considered site-wide, the averages for these two fractions are significantly below target values, which in themselves are considered conservative. A level 3 assessment was then undertaken based on groundwater results from the glaciofluvial deposits (the perched groundwater was not considered to be in hydraulic continuity with the minor aquifer and therefore the river) – not considered to be a significant risk to the River Rea from groundwater. Whilst some visual and olfactory evidence of hydrocarbon contamination was noted around the tanks, subsequent analysis identified no significant concentrations. Additionally a visual inspection did not identify any evidence of historic fuel spills. However, it was noted that, when the tanks are removed as part of the development, should any as yet unidentified contamination be encountered, steps will be taken to deal with it accordingly. The report concluded by indicating that a detailed remedial method statement plan would be prepared and submitted. It was recommended focus should be given to the removal of the free product. It highlights that the proposed whole site concrete cover will break the direct contact/ingestion route for human health and also reduce further contamination from the surface impacting the ground. The P20 assessment confirmed that the hydrocarbon levels identified on the site do not pose a risk to controlled waters; however, the contaminated perched groundwater in the fill could potentially migrate to neighbouring sites and there is an associated risk of vapours from the free phase oil located on the surface of the perched groundwater accumulating in buildings on neighbouring sites. Proposed method is to remove the majority of the free phase oil from the top of the groundwater using skimmer pumps in a covered trench – it is proposed to excavate the trench along the eastern boundary where contamination is most significant. Proposed to monitor groundwater regularly throughout the works.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (as still apparent need to further characterise the site especially in terms of risk to controlled waters)

HS2 WEST MIDLANDS – LAND QUALITY REPORT REVIEW PRO FORMA

REPORT TITLE:	Factual Report Contaminated Land Investigation at Saltley Depot (Ref. 11461V.98/SAL/F)

SITE LOCATION:	Landor Street Extension (Saltley Depot)

DATE PREPARED	November 1998	**DATE REVIEWED**	05/06/13

AUTHORED BY:	Weeks Consulting Engineers & Environmental Scientists	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

See Ref. 072 and 073 for subsequent 2009 and 2010 report reviews

Weeks were commissioned by English, Welsh and Scottish Railways (EWS) Railway to carry out intrusive investigations at 4 sites throughout the UK. This report presents the factual findings for the fieldwork carried out at the Tyseley site. Interpretation of the information is presented in Weeks Report Ref. 11461V.98/SAL/I. It was noted that at the time of writing the site was used by EWS Railways as a re-fuelling and light maintenance depot. Fieldwork scope originally consisted of 6 no. rotary percussion boreholes and 15 no. shallow hand portable WS boreholes (maximum depth 4.0 m bgl), however, WS5 was abandoned due to shallow groundwater infiltrating into the service inspection pit through railway ballast.

SCOPE OF REPORT

GI Factual Report.

CONCLUSIONS

Groundwater encountered during drilling of five of the six rotary holes at depths ranging from 3.70 m (BH01) to 4.30 m (BH5). Water seepage noted in WS03, WS07, WS10, WS12 and WS14 at depths of between 1.10 m (WS10) to 3.40 m (WS14). Monitoring level data from the 6 no. installed rotary holes was undertaken but couldn't be seen in the report.

GI confirmed the documented geology of made ground across part of the site underlain by MMG while across other parts of the site (particularly western sections) glaciofluvial sand and gravel was revealed below made ground. Made ground was encountered in all holes to depths ranging from 0.40 m (WS03) to 3.50 m (WS09).

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (based on site context alone)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	European Metal Recycling Ltd. Landor Street Extension (Saltley Depot), Birmingham Environmental Assessment Report (Ref. ME/06/6933 Rev 1). File provided also includes various letter/e-mail correspondence.

SITE LOCATION:	Landor Street Extension (Saltley Depot), Birmingham

DATE PREPARED	September 2008	**DATE REVIEWED**	05/06/13

AUTHORED BY:	Mayer Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

The purpose of the investigation was to provide information on potential contamination that may exist. Mayer Environmental Ltd. (MEL) was commissioned by European Metal Recycling Ltd. (EMR) to assess previous reports and undertake intrusive investigation in order to gain the additional information required to recommend remedial measures for the site.

At the time of writing the site was occupied by ten railway sidings and two buildings. The building in the east was used as amenities building for management and crew and the building in the west as a maintenance shed. A compound of bunded above ground fuel tanks was in the south west which is presumably fed via an underground pipe from a fuel entry point noted on the eastern boundary.

GI comprised of 10 no. CP boreholes to a max depth of 8.0 m bgl.

Various letter/e-mail correspondence provide in the file – details given in conclusions section below.

SCOPE OF REPORT

Environmental Assessment Report.

CONCLUSIONS

Generally fill (max depth 4.5 m bgl) overlying possible alluvial deposits, over glaciofluvial sands and gravels over MMG; perched groundwater was encountered in the fill (as well as a deeper level around the top of the glaciofluvial deposits) and visual and olfactory evidence of hydrocarbon contamination was noted in the majority of locations predominantly in the fill. Return visits detected free product on top of the groundwater varying between 0.4 – 30 cm in thickness in the majority of the holes.

Elevated TPH detected within the fill across the site. Groundwater sampled from the ash fill materials showed free product and elevated hydrocarbons (significantly elevated in BH7). The groundwater sampled from the glaciofluvial deposits showed traces of hydrocarbon contamination. Therefore, there is a risk to human health from pathways including direct contact, inhalation and ingestion. No pollutant linkage is considered to exist for the surface water receptors (restricted by the clay lining of the canal and the distance (130 m west) to the River Rea. It was also stated that additionally, once the source was removed, there would be considered to be a low risk to these receptors as the alluvial clay should act as a natural barrier to inhibit movement of potential contaminants to these receptors as well as

downwards to the minor aquifer (glaciofluvial deposits).

The decommissioning of the fuel tanks is recommended prior to remedial works in order to remove the main source of hydrocarbon contamination (further investigative work may be required in the areas of the ASTs before this can be achieved). Proposed remedial measures comprise the excavation of a trench(s) to remove free product by skimmer pumps and concreting the site to remove pollutant linkages between the fill materials and future site users (will also act to reduce future contamination from surface). Continued regular monitoring of groundwater.

No gas monitoring has been undertaken to date. This may be required if new building structures are to be developed (membrane protection may be necessary).

Care must be taken that any proposed construction works do not puncture the alluvial layer which is seen to be acting as a natural barrier against contamination migration. Also any piling methods must be sympathetic to the contamination issues at the site.

In terms of the additional letter correspondence, extra information is provided below as appropriate in chronological order:

- Included are some groundwater monitoring sheets dated 19/01/2007;
- Letter from Envirotech (the company proposed to undertake the remedial works) to MEL on 9th June 2008 detailing their groundwater remediation proposal (details how they aim to achieve the remediation target of <1mm of residual free product via skimming);
- Letter from Paul Burns (BCC) to Halcrow Group Limited dated 15th July 2009 relating to Planning Application N/03143/09/FUL (Duddeston Mill Road, Nechells, Birmingham) submitted by Halcrow. States opinion that the site needs further general characterisation over and above what has already been done by MEL;
- Letter from Paul Gethins (EA) to Alison Powell (Development Directorate) dated 12th August 2009 relating to the feral of an application for the change of use of former sidings to form extension to the metal recycling facility and ancillary development to include new storage compound, new boundary fencing, floodlighting, CCTV, weighbridge office, ELV building and parking / circulation areas at Duddeston Mill Road, Nechells, Birmingham. It is stated that the Agency has no objections, in principle, to the proposed development but recommends that if planning permission is granted that conditions are imposed – these are detailed and include items related to flood risk/drainage and contamination. The contamination conditions include preliminary RA; SI scheme; Results and DQRA and an options appraisal and remediation strategy; Verification plan. The reason given is that the information to date did not adequately characterise the site especially in relation to risk to controlled waters;
- E-mail from MEL to Paul Burns (BCC) sent 25th August 2009 to offer invite to attend additional phase of intrusive investigation at the site (one day of WS focussed on the tank areas and the western boundary in response to EA comments on the 27th August). Paul replied the same day to say he cannot due to prior commitments but could MEL forward a copy of the EA comments for BCC's records.
- Letter from MEL to Paul Burns (BCC) dated 5th November 2009 presenting further investigative scope to satisfy Paul's requirements as stated at a site meeting the previous week (scope related to that reported by MEL in January 2010 (see Report Ref. 072). Also seeks to confirm that certain enabling works are permitted (mainly demolition) despite the planning conditions apparently preventing the undertaking of any works until the contaminated land issues have been satisfied;

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (as risks found but no evidence of remediation at time of writing)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Former Adderley Park Brick Works, Birmingham Land Quality Assessment (Project Ref. No. 5149)

SITE LOCATION:	Former Adderley Park Brick Works, Birmingham

DATE PREPARED	March 2008	**DATE REVIEWED**	05/06/13

AUTHORED BY:	Ramboll Whitbybird	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Ramboll Whitbybird was instructed by BCC to undertake a desktop land quality assessment for the Former Adderley Park Brick Works site and surroundings, Birmingham. The proposed scheme is a mixed use development potentially including commercial properties, hotels, a sports stadium, a theme park, lake, community facilities and residential accommodation. The aim of the assessment is to identify potentially significant ground based hazards arising as a result of historical and current site activities and develop a concept strategy for site preparation prior to development.

SCOPE OF REPORT

Desktop Land Quality Assessment

CONCLUSIONS

Geology comprises variable depths of Made Ground overlying MMG. Perched groundwater is present in the Made Ground which is inferred to flow to the west. MMG is designated as an aquiclude. Nearest surface water is the Grand Union Canal which forms the northwest boundary of the site.

North west half of the site, historically brickworks, backfilled in an uncontrolled manner from ~1900 until the 1950s. Wheels Adventure Park developed in the late 1970s (continued to receive imported material for capping purposes and engineered fill until present day). Areas to south and east have predominantly industrial history since ~1900 to present day (engineering works, scrap processing, waste processing and tanning works). Eastern boundary occupied by residential/school for majority of last century. Site is presently mixed industrial, aggregate processing, waste treatment, recreational and residential land uses.

Current/historical uses may have caused, amongst others, elevated ground gas/contamination/combustible fill in Made Ground, instability issues from deep Made Ground with buried slopes, steep slopes across the site which could be instable and invasive plants on site. Insufficient current data on chemical condition of strata/groundwater. Also potential for changes to groundwater regime (may result in differential settlement) and former structures (may present obstructions).

Without appropriate mitigation, key receptors include future site occupants (via direct contact and ingestion of dusts/soils), existing and proposed buildings (via ground gas, chemically aggressive groundwater, ground fires or differential settlement) on and adjacent to the site and the Grand Union Canal (via groundwater transporting soil leachate migrating off site).

Recommendations for further work including additional intrusive SI, physical and chemical treatment of contaminated materials, ground modelling and engineering, gas protection measures in the proposed developments, retaining walls and capping layers in the landscaped areas. Summary – significant enabling works required to provide a devilment platform (estimated at ~£30 – 45M). Substructure costs for future buildings could be up to 30% higher due to the significant residual thickness of Made Ground.

Whilst numerous GI over the last 30 years has been undertake, the data is limited as the breadth of the investigation is low. According to BCC summary sheet – Review of 36 previous geotech/environmental reports suggest Made Ground up to 20 m thickness; groundwater in Made Ground perched on top of MMG. Max CH4 45%, max CO2 19%, flow 5.7 – 43 l/hr; gas concentrations highly variable. Widespread elevated concentrations of sulphates and metals including Cr, Pb, Ni in excess of (old) commercial SGV. Testing limited although based on BH logs probable that significant organic contamination present. Elevated NH4, CL2- and TOC in groundwater.

Recommended to carry out detailed investigation with the principle aim of refining the CSM and further characterisation of site hazards in order to assist with preliminary designs and costing of the scheme. The investigation should cover the following works:

- Detailed 3D topographic survey of the whole site;
- Geophysical/remote sensing survey (i.e. gravimetric, infrared);
- Intrusive GI
- Chemical testing
- Geotechnical testing
- Testing for combustibility potential;
- Testing for treatability/pilot study with regard to preferred remedial solution;
- Groundwater monitoring; and
- Ground gas monitoring.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Phase 1 Geo-Environmental Audit at the Former Alstom Site, Washwood Heath, Birmingham

SITE LOCATION:	Former Alstom Site, Washwood Heath, Birmingham

DATE PREPARED	January 2005	**DATE REVIEWED**	03/09/13

AUTHORED BY:	Halcrow Group Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Halcrow was commissioned by St Modwen Developments Ltd to undertake a Phase I Geo-environmental Audit of the Alstom Site, Washwood Heath, Birmingham. The site is currently occupied by the Alstom railway engineering plant with associated railway sidings. A small cement works is located within the western area of the site. The report provides the basis for progressing the design and execution of a phased programme of detailed intrusive ground investigation as the project develops. In addition the report contains recommendations for further studies and discusses the implications for the proposed redevelopment of the site for general industrial, warehousing and light industrial or office uses.

The report was received together with an Environmental Statement summary and an Environmental Statement Environmental Search undertaken by BCC (considered to support the Phase 1 report) and a document entitled 'Supporting Information for the Outline Planning Application at the Former Alstom Site, Washwood Heath'. The latter summarises archaeology/cultural, ecology, visual/landscape, noise and drainage considerations at the site and has therefore not been considered in detail as part of this review for Land Quality.

SCOPE OF REPORT

Phase I Geo-environmental Audit

CONCLUSIONS

Historically, the site was primarily used for agriculture, with the western area also occupied by old clay pits, cottages, a hospital and allotments until the early 20th Century. By the 1920s sidings and train manufacturing works had been constructed on site and these have stayed broadly the same until present day. The cement and concrete works have been present in the west of the site and northwest of the site since the early 1990s. During WWII bombs were dropped on the site and a single high explosive bomb dropped in the centre of the site may have altered the physical properties of the ground there. Also potentially contaminative surrounding land uses were noted including a gas works to the north west and LDV vehicle manufacturing works adjacent east.

The superficial deposits at the site comprise Made Ground, River Terrace Deposits and glacial sand and gravel overlying strata of the Mercia Mudstone Group. This strata has a shallow dip to the east and is underlain at depth by strata of the Sherwood Sandstone Group, comprising the Bromsgrove and Kidderminster Sandstones. The Mercia Mudstone is identified as a non-aquifer, the glacial deposits as a Minor Aquifer with soils of high leaching potential and the Sherwood Sandstone as a Major Aquifer of high permeability. The River Rea is 300 m west of the site (approximately 150 m from the northern boundary where it joins the River Tame to the north east), the Grand Union Canal is 250 m west and a boating lake is present 400 m south east with a sink indicated immediately to its north. A stream is also showing flowing towards the south west corner of the site before flowing north towards the River Rea

(possibly through or underneath the area of gas works to the north west). Two streams noted on site from historical mapping may still be present culverted beneath the site.

Previous investigation indicates Made Ground varying from <1 m thick to 11 m further north. Groundwater was recorded at depths between 7.4 metres below ground level (m bgl) and 11.3 m bgl in one 1991 investigation, whilst previous investigation from 1997 noted groundwater in one borehole to be at 4.10 m bgl rising to 3.10 m in twenty minutes. Made Ground was often noted to be wet/saturated. Previous investigation indicated some evidence of hydrocarbon contamination, as well as elevated levels of arsenic, zinc and copper and some asbestos.

Generally, moderate risks were assigned (occasionally low and high). A Phase II intrusive ground investigation was recommended considering both geo-environmental and geotechnical conditions.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Generally moderate, potentially high

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Geoenvironmental Assessment, Hotel la Tour, Birmingham, Hotel la Tour (Birmingham) Ltd

SITE LOCATION:	Hotel la Tour, Birmingham

DATE PREPARED	July 2010	**DATE REVIEWED**	03/09/13

AUTHORED BY:	WSP Environmental Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

WSP Environment and Energy Limited (WSP) was commissioned by Hotel la Tour to undertake a Geoenvironmental Assessment for a site located off Masshouse Lane, Birmingham B4 7XG for the proposed redevelopment of the site as a hotel. The redevelopment of the site was to comprise the construction of a new hotel building comprising an eight storey structure with one storey of below ground basement/operational areas.

The aim of the assessment was to provide supplementary information on ground and ground contamination conditions at the site. Historical ground investigation was previously undertaken by others at the site in 2005 and this identified elevated heavy metals and hydrocarbons in soil as well as elevated methane during monitoring. It was suggested that a 'leaking tank' may have contributed but no evidence of such a tank was presented in other key reports. The ground investigation was undertaken between the 18th and 20th May 2010 and comprised the drilling of one rotary cored borehole and seven trial pits together with a programme of follow-on gas monitoring. Geo-environmental testing comprised of soil/water testing including for various metals/other inorganics, EPH/TPH, PAH and VOC/sVOC.

SCOPE OF REPORT

Geo-environmental Assessment

CONCLUSIONS

Ground conditions at the site were generally consistent with those encountered during historical investigations. Variable thicknesses of Made Ground were encountered to a maximum depth of 4.1 m bgl with thicknesses typically in the order of 3 m identified. Within the Made Ground, frequent obstructions and suspected historical building foundations were identified within the majority of trial pits excavated at the site. Natural geology comprised light beige and red sands and gravelly sands of the fluvio-glacial deposits. These were encountered in all exploratory holes beneath made ground to a maximum recorded depth of 8m bgl. Bedrock of the Bromsgrove Sandstone formation was encountered within BH101 at a depth of 8 m bgl and comprised very weak to moderately weak fractured sandstone to a maximum proven depth of 29.1 m bgl.

No observations of potential contamination were recorded during the excavation of the exploratory holes. A suspected chemical drum base was encountered at 2.0m bgl in TP103 however no associated residual or olfactory contamination was observed. No evidence of hydrocarbon contamination was identified within the hot spot areas suggested from previous investigation.

Chemical analysis identified the presence of elevated heavy metals, petroleum hydrocarbons and asbestos fibres within Made Ground. The risks associated with this contamination are generally restricted to the construction phase of the development as the final development will comprise hardstanding cover which will break any direct contact

exposure pathways.

Significant risks to controlled waters have not been identified. Ground gas monitoring undertaken following the completion of ground investigation works did not identify any ground gas concerns and no additional gas protection measures are considered necessary for the final building.

Foundations for the new build will require piles toed into the moderately weak sandstone. Indicative pile calculations and capacities have been determined however it is recommended that consultation with a specialist piling contractor is undertaken to determine the most appropriate piling solution. Due to the presence of numerous potential obstructions and cobbles within the Made Ground, it is likely that a fully suspended floor slab will be required.

Health and safety considerations and control measures will need to be adopted during the groundworks and due to the presence of asbestos fibres within soils, there is a risk of dust and fibre generation and mitigation measures will be required to reduce these risks. It is recommended that the advice of an asbestos specialist is sought prior to the commencement of works on site.

Should there be a need to remove any excess materials from the site due to earthworks balancing there is the potential that some of this material will be classified as hazardous waste due to the presence of asbestos, metals and hydrocarbons. Prior to off-site disposal, a waste classification exercise will need to be undertaken following the collection of samples of material destined for off-site removal.

No additional remediation requirements have been identified associated with contamination at the site.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low (the hotel is now built and operational)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Birmingham City University, City Centre Campus, Phase 2 Interpretive Ground Investigation Report

SITE LOCATION:	Birmingham City University, City Centre Campus, Birmingham

DATE PREPARED	October 2009	**DATE REVIEWED**	03/09/13

AUTHORED BY:	Ove Arup & Partners Ltd	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Ove Arup & Partners Ltd (Arup) was commissioned to design, supervise and report a Phase 2 ground investigation to identify potential ground constraints relating to Birmingham City University's (BCU) proposals to build university buildings, to both the north and south of Banbury Street.

The objectives of the ground investigation were to provide information to support the final design of the development, specifically for:

- To inform the Foundation Design.
- To inform an assessment of the risk posed by previous potentially contaminative uses
- To allow the development of a Remediation Strategy to be prepared and agreed with the Environment Agency and Birmingham City Council.
- To allow an Earthworks Enabling works package contract to be designed; essentially to remove any contaminated soils identified by the risk assessment, remove and replace any unsuitable founding materials, and excavate and prepare the site to an initial formation level.

The ground investigation (comprising of boreholes and trial pits) and subsequent gas/groundwater monitoring was carried out by Geotechnical Engineering Ltd between June and August 2009, under the direction of Arup. It supplements a Phase 1 ground investigation, carried out in 2007. This interpretative report discusses the findings of both the Phase 1 and the Phase 2 intrusive ground investigations. Geo-environmental testing included soils, leachate and groundwater (comprising of various determinands including various metals/other inorganics and organics including speciated PAH/TPH).

SCOPE OF REPORT

Phase 2 Interpretive Ground Investigation Report

CONCLUSIONS

Mixed use development of this area of Birmingham commenced in the 19th century, and progressive industrialisation subsequently occurred. By the early 20th century various potentially contaminative industries were located at the site. The key strata beneath the site are Made Ground (up to 3.30 m in thickness where proven), overlying Organic Clay, overlying Glaciofluvial Deposits, overlying Weathered Bromsgrove Sandstone (depth to top 2.30 m below ground level (bgl) to 5 m bgl), overlying Bromsgrove Sandstone. The Digbeth Branch Canal is located approximately 135 m to the south-east of the site, and the River Rea flows north-east to south-west, passing the site approximately 500 m to the north-east. The Bromsgrove Sandstone is a Major Aquifer.

The revised Conceptual Ground Model noted that the ground in the vicinity of the site slopes south-east towards the river and the groundwater flows in the same direction. It is not conceivable that contamination from the site could impact the groundwater to the north-west. The Birmingham fault lies to the south-east of the site between the site and the River Rea. Beyond the fault the sandstone that underlies the site is replaced by mudstone and so the flow path between the site and the river is therefore likely to be complex and is not likely to be viable. An Archaeological Assessment undertaken at the site in 2008 suggests that the site was originally waterlogged. The natural water level at is probably at or close to the top of the natural ground beneath the site. Current water levels are close to this level (monitoring suggests range of 2.15 m bgl – 5.59 m bgl).

Testing for a range of contaminants that guidance suggests might be associated with the former uses of the site has revealed that, whilst localised elevated levels of for example lead and hydrocarbons were encountered, both the Made Ground and the natural superficial deposits can be considered to be uncontaminated with respect to the proposed end use.

Various exceedences were encountered in the leachate and groundwater assessments. Detailed quantitative risk assessment has been undertaken using the EA's Remedial Targets Worksheet (RTW). This suggests that the fluoranthene associated with areas of visible or olfactory evidence of hydrocarbon contamination probably represents a threat to the groundwater. The site soils may present a hazard to construction works and users of neighbouring site during construction of the new buildings. Ground gas has been found on the site equivalent to between Characteristic Situation 1 and 2 defined by BS8545.

Mitigatory recommendations include the removal of an old oil tank and inspection of each part of formation as the site is stripped identifying and removing/treating hot-spots. Validation sampling should be undertaken on each 50m^2 of the formation strip. Other standard mitigation including best practice, H&S planning and investigation/removal of any contamination encountered are recommended during the construction phase to counter identified pollutant linkages whilst appropriate construction materials should be used to counter risk from chemical attack.

Paul Burns (BCC EPO) responded to Arup by e-mail on 10th December 2009 having reviewed the assessment to confirm that he is satisfied with the findings and proposed mitigation measures. Paul stated that the results of the validation testing of the formation following the site strip should be submitted to BCC for consideration, whilst separate confirmation should be sought from the EA that they are satisfied that issues relating to the pollution of controlled waters have been adequately addressed.

Note (unrelated site): the e-mail from Paul Burns also covers his comments relating to Eastside City Park (covered by Arup's Interpretative Ground Investigation Report, May 2009, Ref 208230) – a separate development north of the City Centre Campus site, the report to which is not available. In the correspondence, Paul confirms that in general he agrees with the proposals for addressing contamination at the site (inspection of the formation following site strip to identify and remove hot-spots and the capping of areas of general contamination). Verification findings should be submitted to BCC (acceptable levels of contamination for the capping layers and the depth of cover should be agreed with BCC in advance). Paul questions how the pollutant linkage between groundwater contamination in BH202 and the underlying major aquifer will be addressed as well as seeking clarification on the stated pathways to contaminated groundwater. Paul states that separate confirmation should be sought from the EA that they are satisfied that issues relating to the pollution of controlled waters have been adequately addressed.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low/Moderate (potential risk posed to controlled waters – uncertain if the validation was ever undertaken/signed off as no paperwork to evidence this)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	1A Bordesley Street, Digbeth, Ground and Boundary Walls Investigations Report

SITE LOCATION:	1A Bordesley Street, Digbeth, Birmingham

DATE PREPARED	April 1992	**DATE REVIEWED**	03/09/13

AUTHORED BY:	Birmingham City Council Engineers Department Urban Development Division	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

The site is a cleared area of land (0.091 ha) formerly occupied by industrial buildings. Demolition of the buildings and the site clearance resulted in the site being left at two general levels – a high part (Area 1A – 0.042 ha) accessed from Bordesley Street and a low part (Area 1B – 0.049 ha) accessed from Shaw's Passage. The difference in level is approximately 3 m occurring at a north to south brick wall. This report covers the ground site investigation works together with a structural survey of the walls forming the boundaries to the site.

Ground Investigation works were undertaken by Exploratory Associates Limited during February and March 1992 and comprised of a total of nine cable percussive boreholes (approximately 6 m depth in Area 1A and between 3 and 4.25 m depth in Are 1B) and nine trial pits to depths ranging from 0.75 m to 3.6 m. Geo-environmental testing included for various metals/other inorganics as well as coal tars, mineral oils, phenol and toluene.

It is understood that the site is to be developed for car parking initially but with a possibility of later development for light industrial units.

SCOPE OF REPORT

Ground and Boundary Walls Investigations Report

CONCLUSIONS

Made Ground ranging in thickness from between 1.6 m and 3.9 m) was encountered overlying Bromsgrove Sandstone. The sandstone was often weathered or in parts possibly re-worked at the top (although no weathered zones were encountered in Area 1B); the depth of weathering ranged from between 1.6 m and 4 m. Groundwater was only encountered in BH1 (4.7 m below ground level (bgl) rising 30 mm in 20 minutes) – this took the form of seepages and no major strikes were encountered.

Given the thickness of Made Ground either piles or ground treatment (preferably removal of a layer of Made Ground, proof rolling of the exposed formation level and then replacement of the excavated materials with selected well compacted granular fill). No major excavation dewatering operations are anticipated based on the data. Testing indicated typically Class 2 sulphate conditions in accordance with BRE Digest 250, with localised Class 4.

Levels of contamination have been categorised in accordance with the joint ICRCL/Kelly classification (ICRCL 59/83 1987). Arsenic, chromium, total cyanide and coal tar were shown to correspond to a category of uncontaminated. Lead, cadmium, phenol, toluene, mercury and sulphide mainly corresponded to classifications ranging within the

contaminated to uncontaminated categories but with lead in Area 1A giving heavy contamination classification in the vicinity of BH1. pH values proved to be slightly alkaline in the main and falling within the classification for uncontaminated soil. Copper and nickel were also particular high (especially in Area 1A) and may be considered as heavily contaminated despite there being no available criteria. The high copper and zinc concentrations combined with the low nickel suggest7 the possible presence of brass scrapings in the Made Ground of Area 1A. Final development design will drive the required treatment of the contaminated Made Ground, however, it is recommended that the strata is not left exposed subsequent to completion of the site works. During operations PPE, washing facilities and dampening down should/may be used as appropriate to minimise exposure. Work areas should be restricted to authorised personnel only. If excavated Made ground is removed off site it should be done so in covered lorries and placed within suitable landfill at a licensed tip.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (potentially contaminative concentrations encountered, but out-dated screening criteria applied and so further investigation should be undertaken to clarify risk in the context of up to date legislation)

HS2 WEST MIDLANDS – LAND QUALITY REPORT REVIEW PRO FORMA

REPORT TITLE:	Fortmere Properties: Proposed Hotel, Park Street/Bordesley Street, Birmingham, Report on Ground Investigation (Report No J06185/01)

SITE LOCATION:	Proposed Hotel, Park Street/Bordesley Street, Birmingham

DATE PREPARED	December 2006	**DATE REVIEWED**	03/09/13

AUTHORED BY:	Spilman Associates Limited	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Spilman Associated Limited were appointed by Fortmere Properties to carry out a ground investigation for a proposed hotel at Park Street/Bordesley Street, Digbeth, Birmingham. This report presents the findings of desk study research, an intrusive investigation and associated monitoring/testing and is intended to satisfy the anticipated requirements of the Local Authority with respect to Planning and Building Regulations.

Desk study information identified potentially contaminative sources both on and off-site. The closest surface water feature is the River Rea 500 m east, while the closest licensed surf ace water abstraction is 507 m east and is for abstraction from the River Rea for industrial use. The solid Bromsgrove Sandstone Formation geology is classified as a major aquifer. There are only two licensed groundwater abstractions within 1 km (none within 500 m) both described as being of general use and relate to hotel premises. The site is not within an SPZ.

The site works were undertaken on 28th November 2006 and comprised the excavation of four machine dug trial pits. Gas monitoring standpipes were installed in two of the trial pits and gas monitoring was undertaken on two occasions. Testing included the former ICRCL suite, speciated PAH/TPH, VOC/sVOC and sulphate/pH.

The report is accompanied by a letter from Tweedale Ltd (working for Fortmere Properties) dated 9th May 2007 enclosing a copy of the Spilman Associates Limited report to the Director of Planning & Regulation at BCC. It states that it is hoped that the report should satisfy the LA's requirements as stipulated within Condition B10 of the permitted application No. C/07995/05/FUL. It goes on to state that Fortmere Properties have instructed Birmingham Archaeology in accordance with requirements of Condition C3. A further letter from BCC's Principal Planning Officer dated 16th May 2007 forwards the information to Andy Hall (BCC) for review and advice as to whether it is sufficient to discharge the condition. No further correspondence is included and so it is uncertain as to whether the condition was discharged – the covering BCC Site Investigation Summary sheet notes the following: 'Report found in 2010. Unclear as to what action/recommendations were given by the team'.

SCOPE OF REPORT

Report on Ground Investigation

CONCLUSIONS

Made Ground was encountered in all trial pits to depths in the range 2.60 m to 3.70 m with suspected original topsoil identified in TP1 from 2.60 m to 3.30 m and in TP4 from 3.00 m to 3.40 m. Weathered Bromsgrove Sandstone was encountered in all trial pits at depths between 2.80 m and 3.70 m; the sand rapidly graded into a weak sandstone at depth in the range of 3.50 m to 4.00 m. No groundwater was encountered with the exception of a slight seepage was

recorded in TP1 at 3.10 m within the Made Ground.

No visual or olfactory evidence of soil contamination was identified. Concentrations of all determinands were below accepted guideline values except a single elevated lead concentration. The nature of development is such that the majority of the Made Ground will be removed prior to development whilst the development is of a hard-cover nature breaking any conceivable pathway between any source and humans receptors. Accordingly no specific remedial works are considered necessary.

Risk to controlled waters is assessed to be very low as most Made Ground will be removed; testing has indicated the underlying natural ground to be uncontaminated; the development will comprise hard cover preventing infiltration and potential leaching; and there are no sensitive controlled water receptors close to the site with the exception of the underlying major aquifer. No specific remedial measures are therefore considered necessary with respect to controlled waters.

Ground gas monitoring has indicated an absence of methane but elevated carbon dioxide (maximum 4.2%) – the source is anticipated to be the Made Ground. At the time of writing no trigger levels were available but 1% and 1.5% for methane and carbon dioxide respectively were frequently used; in accordance ground gas protection measures are recommended to include a proprietary Gas Resistant Membrane or 2000 gauge Damp Proof Membrane (DPM).

It is anticipated that the majority of the Made Ground will be removed to facilitate basement construction. Conventional pad foundations onto the Bromsgrove Sandstone at around 4 m below site level are considered appropriate. Alternatively a basement raft foundation could be employed on the sand or underlying sandstone. Ground bearing slab would be acceptable assuming all Made Ground beneath the slab were removed. Excavation stability and any potential interference with railway infrastructure need to be considered although groundwater ingress to basement excavation around 4 m would not be anticipated based on current data. DS-1 (AC-1) is considered an appropriate sulphate design class in accordance with BRE Special Digest 1 (2005) based on sulphate and pH testing.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low (no specific remedial measures considered necessary, with only low classification gas mitigation required; however, uncertain as to whether BCC saw the report fit for discharge of the planning condition and whether they had any follow up comments)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Birmingham City University, City Centre Campus Phase 2, Geo-Environmental and Geotechnical Interpretative Report

SITE LOCATION:	City Centre Campus, Eastside, Birmingham

DATE PREPARED	February 2012	**DATE REVIEWED**	04/09/13

AUTHORED BY:	WYG Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

WYG Environment Planning Transport Ltd (WYG) was commissioned by WYG Engineering, on behalf of Birmingham City University (BCU), to complete a Geo-Environmental and Geotechnical Interpretative Report for a ground investigation at the proposed Phase 2 site, City Centre Campus, Eastside, Birmingham. The report is based upon information obtained from the desk top study (also undertaken by WYG dated September 2011 ref: A071774 DTS – see review ref 083) and ground investigation works. The principal aim of the report is to present an assessment of land quality and ground engineering issues, to support the planned development works.

Various potentially contaminative on and off-site sources have been identified including a saw mill, railway land use, wire works, printing works, aluminium casting works and brass stamping works, timber yard, vehicle maintenance fuel filling station, cement works and paint / metals coatings works. There is an active discharge consent to the Canal from the cement works; pollution incidents to the canal include fuel spills.

Previous site investigations have indicated that up to 3m of Made Ground may exist on site, the majority of which is granular. The Made Ground is underlain by predominantly Glacio-fluvial sands, with some bands and lenses of gravel, cobbles, clays and interglacial clays / silts possible. The solid geology at the site comprises bedrock of the Bromsgrove Sandstone Group (Principal Aquifer) and numerous boreholes are licensed to abstract within 2 km of the site. Local soils are classified as having high leaching potential. It is understood that the groundwater beneath Birmingham is generally impacted with chlorinated hydrocarbons, from historical metal finishing processes.

The closest surface water feature is the Digbeth Arm Canal, immediately east of the site. The River Rea is approximately 300 m southeast, running generally northeast. The Environment Agency currently classifies the ecological quality of the canal as 'moderate' under the river basin management plan and the River Rea as 'bad'. The current chemical quality of the canal is classified as 'high'; the River has no classification.

Based on the desk top study the overall potential contamination risks posed to future site users, flora and fauna, construction workers, controlled waters, future buildings and services are considered to be low to moderate from on-site sources (moderate for ground gas).

A site investigation was designed based on the preliminary risk assessment and desk study information. The investigation was undertaken by Applied Geology between the 21st November and 13th December 2011 and comprised of 9 no. cable percussion boreholes, 5 no. windowless sample holes, 2 no. rotary boreholes and 12 no. trial pits. 9 no. gas and groundwater monitoring wells were installed and 6 gas monitoring visits were undertaken between 6th December 2011 and 10th January 2012. Soil, surface water and groundwater samples were analysed for site specific suite of laboratory analysis.

SCOPE OF REPORT

Geo-Environmental and Geotechnical Interpretative Report

CONCLUSIONS

Ground conditions encountered comprised of asphalt, grass and granular Made Ground surfacing (up to 3.30 m in thickness). Frequent buried obstructions were encountered. Glacial Deposits were encountered across the majority of the site to directly underlie the Made Ground. This in turn was underlain by sandstone bedrock. No groundwater was encountered during the main site works, whilst it was only encountered in BH301A (7.94 m below ground level (bgl)) and BH303A (2.15 m bgl).

The results of the soil laboratory testing were screened against commercial screening values. All the results were less than the applicable Tier 1 screening values with the exception of benzo(a)pyrene. Asbestos was also noted at one location. Statistical analysis indicates the benzo(a)pyrene to be a localised area of contamination. The results of the groundwater and surface water testing were screened against the Water Framework Directive Standards with reference to being protective of both the surface waters and groundwater. Although elevated determinands were encountered it is considered that the concentrations do not pose a significant risk to controlled waters and that the site is not adversely impacting the canal.

The ground and groundwater contamination risk posed by the site is generally low to all receptors with the exception of the following:

- A low – moderate risk is posed by the following sources to the identified receptors:
    - Made Ground to the principal aquifer.
    - Benzo(a)pyrene to future site users and the principal aquifer (controlled waters).
    - Gas risk to construction workers (based on the implementation of appropriate working procedures and PPE).
- The asbestos poses a moderate to construction workers.
- The gas risk is moderate to future site users and buildings.

Widespread in-ground obstructions will constrain the use of conventional spread foundations on the majority of the site, whilst large scale excavations would be required to reach the underlying sand deposits and/or the top of the rock for the purpose of placing spread foundations on a suitable bearing stratum. It is likely that alternative foundations will be needed for the building, such as piles socketed into the top of the sandstone. While not generally encountered in the recent investigation, there is a possibility that voids may be present within the Made Ground and so it is recommended that a suspended floor solution is adopted in conjunction with a piled foundation solution. In accordance with BRE Special Digest 1 (2005), test results indicate a design classification of DS-2 and AC-1s for buried concrete.

Gas protection measures will be required at the site in line with Characteristic Situation 2 and as such will need to be incorporated into building design (details should be discussed and agreed with the Local Planning Officer/Building Control prior to detailed design and installation).

The following was concluded:

- Gas Mitigation is required
- A hotspot of benzo(a)pyrene may require delineation and removal (subject to consultation with Local Planning Authority (LPA))
- The issue of asbestos within the area at and adjacent to TP307 at shallow depth should be investigated further.
- It is unlikely that further groundwater assessment will be required, although this is subject to EA agreement.

Based on the site investigation, subsequent assessment and the nature of the contaminants encountered it is proposed that localised removal, appropriate disposal and validation is undertaken subject to consultation with the local authority with respect to:

- Removal of the benzo(a)pyrene impacted soils at and adjacent to WS303. Specifically soils which match the exploratory hole description at and around 0.7 m bgl.
- Removal of asbestos impacted soils at and adjacent to TP307 at and around 0.1 m bgl.
- Gas protection measures.

Soils below and adjacent to the above locations will need to be tested for the contaminants of concern. Due to the small volume of material to be disposed of/treated it is probable the most feasible treatment method would be removal and disposal off site at an appropriate waste facility. Asbestos impacted soil will need to be disposed of as hazardous waste. In addition the acceptability of re-using site won soils, crushed demolition materials and imported soils (including topsoil) should be confirmed with the LPA. This is likely to require confirmation of the source of the materials and test results to confirm its suitability for use on site. Testing criteria, frequency and validation of gas protection measures will need to be agreed with the LPA.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate (uncertain as to whether the outline remediation strategy has been implemented).

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Birmingham City University, City Centre Campus Phase 2, Geo-Environmental and Geotechnical Desk Top Survey

SITE LOCATION:	City Centre Campus, Eastside, Birmingham

DATE PREPARED	September 2011	**DATE REVIEWED**	05/09/13

AUTHORED BY:	WYG Environmental	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

WYG Environment Planning Transport Ltd (WYG) was commissioned by WYG Engineering, on behalf of Birmingham City University (BCU), to undertake a desk top review of the proposed Phase 2 site at the City Centre Campus, Eastside, Birmingham. The principle aim of the works is to provide information to allow a preliminary contamination and geotechnical assessment of the site for planning and design purposes.

Various potentially contaminative current/historical on and off-site sources have been identified including a saw mill, railway land use, wire works, printing works, aluminium casting works and brass stamping works, timber yard, firearms/gun barrel works, glass works, engineering works, various metal works, lamp works, electric car works, electrical engineers, paint and varnish works, warehousing, toy factory, vehicle maintenance and sales, fuel sales, cement works and paint / metals coatings works. There is an active discharge consent to the Canal from the cement works; pollution incidents to the canal include fuel spills.

Previous site investigations have indicated that up to 3m of Made Ground may exist on site, the majority of which is granular. The Made Ground is underlain by predominantly Glacio-fluvial sands, with some bands and lenses of gravel, cobbles, clays and interglacial clays / silts possible. The solid geology at the site comprises bedrock of the Bromsgrove Sandstone Group (Principal Aquifer) and numerous boreholes are licensed to abstract within 2 km of the site. Local soils are classified as having high leaching potential. It is understood that the groundwater beneath Birmingham is generally impacted with chlorinated hydrocarbons, from the historical metal finishing.

The closest surface water feature is the Digbeth Arm Canal, immediately east of the site. The River Rea is approximately 300 m southeast, running generally northeast. The Environment Agency currently classifies the ecological quality of the canal as ‘moderate’ under the river basin management plan and the River Rea as ‘bad’. The current chemical quality of the canal is classified as ‘high’; the River has no classification.

SCOPE OF REPORT

Geo-Environmental and Geotechnical Desk Top Survey

CONCLUSIONS

Based on the desk top study the overall potential contamination risks posed to future site users, flora and fauna, construction workers, controlled waters, future buildings and services are considered to be low to moderate – and moderate for ground gas – from both on and off-site sources.

The site is covered by Made Ground likely to be up to 3m or more in thickness, underlain by natural soils of variable

thickness and competency. Bedrock may be relatively shallow and pile foundations to this stratum may be the most appropriate form of foundation for multi-storey structures.

It is considered that for the purposes of redeveloping the site, ground investigation will be required to fully assess the contamination risk and for geotechnical purposes to support the design and construction of the development. Detailed GI recommendations are given.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low to Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Nechells Place, Chemical assessment of earthworks materials

SITE LOCATION:	Nechells Place, Birmingham

DATE PREPARED	?? 2007	**DATE REVIEWED**	05/09/13

AUTHORED BY:	HSP Consulting	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

HSP Consulting Ltd were appointed by Ashford's Construction Ltd to undertake a chemical validation exercise of the earthworks materials being recycled in the redevelopment of the former Nechells Gas works.

The site (2.33 ha) formerly operated as a gas works from ~1881 and was remediated under the supervision of Parsons Brinkerhoff (PB) in 2004. The remediation involved a series of site investigations, the demolition and infilling of Gasholder No5 and No6. The remedial works are recorded as beginning on 26th January 2004 and reaching completion on 24th March 2004. PB records that 2740 tonnes of non-hazardous waste and 180 tonnes of hazardous waste was removed to landfill. In addition to these works, a well was decommissioned and a scheme for the management of Japanese knotweed was instigated.

The area is being redeveloped for light commercial industrial end use, the client's engineer ATKINS plc has provided a volumetric rate at which material is to be chemically tested, 1 No validation sample per 250m^3 (agreed with the EA).

This report details an intrusive chemical investigation, the purpose of which is to provide a sufficient level of confidence that the material being recycled during the cut and fill works is chemically suitable (i.e. will not cause significant harm to human health, or the environment) for re-use on site. The import criteria agreed by PB have been used to assess the suitability of material.

Numerous environmental liability assessment and intrusive investigations have been undertaken in relation to the site dating from 1978.

51 No. samples were recovered from the fill material to be recycled via a trial pitting exercise undertaken across the site and were submitted for analysis.

SCOPE OF REPORT

Intrusive chemical investigation. Chemical assessment of earthworks materials – chemical validation exercise

CONCLUSIONS

Whilst the vast majority of the samples recovered were below the screening limits for all determinands, further investigation was warranted due to localised concentrations of lead exceeding 750 mg/kg, as well as elevated total PAH. One sample recorded a TPH concentration of 4900 mg/kg. Where concentrations exceeded PAH/TPH screening limits, further speciation was undertaken, whilst a leachate analysis was undertaken where lead exceedances were noted.

Leachate analysis showed the lead to be unavailable with nothing recorded above the detection limit. The maximum lead recording (36,000 mg/kg at 1.00 m in TH8B) is suspected to be related to a lead pipe (recovered from the sampled area) likely having contaminated the sample. The chemical stability of the material lends itself to on-site disposal where it will not affect human health; therefore this area is to be excavated and replaced under the service yard in an area away from drainage runs (samples from 0.4 m, 2.2 m and 2.9 m in the same hole record much lower values showing accurate confidence in the hot-spot delineation).

Speciation of the 4900 mg/kg TPH sample revealed no detections. STL reported a data manipulation problem, however due to inconsistency with surrounding results HSP undertook further localised investigation submitting 5 No samples with the results showing no elevated TPH (concluded that either lab error or very small spillage hot-spot removed by sampling).

One are of brightly coloured soil was uncovered during earthworks; this was removed into a separate heap and tested for toxic metals, SVOC, VOC, TPH and PAH – no significant concentrations were reported; this material is to be capped off in the service yard.

Having received the report in HSP's letter dated 31 August 2007, Paul Burns (BCC EPO) e-mailed Ben Plenty (planning and regeneration at BCC) dated 28th September 2007 to state that he has received the validation report and has no objection to the discharge of condition B11 of planning application reference C/00009/07/FUL. Condition B11 is copied below for reference:

B11: The reclamation scheme for the site shall be fully implemented, and a validation report demonstrating this shall be submitted to the Local Planning Authority for approval, before any development hereby permitted is occupied. Any variations to the reclamation strategy shall be agreed with the Local Planning Authority in advance. REASON: To ensure the satisfactory completion of the development.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low – remediation appears to have been successful and e-mail correspondence confirms BCC have no objection to the discharge of the related planning condition

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Environmental Management Plan, Gasholder Station, Nechells Place, Nechells, Birmingham

SITE LOCATION:	Nechells Place, Birmingham

DATE PREPARED	September 2002	**DATE REVIEWED**	06/09/13

AUTHORED BY:	Parsons Brinckerhoff	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Lattice Property Holdings pic (LPH) commissioned Parsons Brinckerhoff Limited (PB) on 6th August 2002 to prepare an Environmental Management Plan (EMP) for the demolition of two below ground gasholders No's 5 and 6 at Nechells Place, Nechells, Birmingham.

Various Transco plant and services are present across the majority of the site, whilst foul and surface water drainage systems are both present on-site. A groundwater abstraction borehole licensed by the Environment Agency(EA) (License No. 03/28109/0104) is also present on-site, 112 m deep, installed ~1995 to top up the water seal on the leaking Gas Holder No.6.

The site is underlain by Glaciofluvial gravel and sand deposits, beneath which lie Sherwood Sandstones. Terraced on three levels, Made Ground is present across the site to a maximum depth of 4.8m bgl. The Glaciofluvial deposits are classified as a minor aquifer and the Sherwood Sandstones as a major aquifer. Groundwater, which flows in an easterly direction, lies between 2.5m and 5.5m below ground level (bgl). Groundwater from the Sherwood Sandstone Is abstracted from an on-site borehole. No surface water bodies are located on-site. The River Rea and Grand Union Canal lie some 70 m and 100 m to the east of the site, respectively.

Intrusive ground investigation by Parsons Brinckerhoff Ltd identified the presence of elevated concentrations of the following potential contaminants: Soils: asbestos, Metals (arsenic, lead, copper and zinc with elevated cadmium, nickel and chromium in isolated concentrations); cyanides; PAH's; and TPH's. Groundwater: Metals (arsenic, nickel, iron); naphthalene; total cyanide; BTEX; and TPH's. Evidence from the investigation indicates that there are significant occurrences of free product resting on the water table beneath the site.

SCOPE OF REPORT

Environmental Management Plan

CONCLUSIONS

Whilst no protected species of flora and fauna have been identified at the site, awareness is needed. A small stand of Japanese Knotweed is present on-site to the rear of Gas Holder No.6. At the time of enquiry to the relevant authorities there were no designations or preservation orders located upon the site. The identified stand of Japanese Knotweed shall be managed by the Contractor in accordance with the EA's Code of Practice for the Management, Destruction and Disposal of Japanese Knotweed Version 1

Despite relatively high ambient noise levels (due to surrounding land use) appropriate noise control measures should be established.

Nearby premises should be advised of potential for generation of gas odours prior to work commencing; PPE should be used to protect against lead in the paint and dust control measures applied during demolition/infilling.

Management of site traffic including access/to and from the site should be agreed with all relevant parties.

Discharge of holder waters will be to foul sewer under consent from Sevem Trent Water, complying with the consent parameters. Surface water drains located along the site's tarmac roadway, which reportedly drain to the River Rea, should be protected against uncontrolled discharges and there should be no discharges into the site's groundwater abstraction borehole or across the surface of the site. It is recommended that the EA are contacted regarding the surrender of the abstraction licence and the method to be used for grouting the borehole. The contractor shall work in accordance with the EA Pollution Prevention Guidance document (PPG6) Working at Construction & Demolition Sites.

The site is included on BCC's Sites and Monuments Record as a site of archaeological interest. Whilst this is not a statutory designation, BCC requested that the gas holders are recorded (photography and written description proceeded by archive research top locate any drawings related to construction brought together into a report) prior to and during demolition.

The Contractor shall take measures to protect and secure potential trip and fall hazards on-site during demolition works.

It has been reported that no asbestos containing materials (ACMs) have been identified within above ground structures.
A telemetry mast is present on Gas Holder No. 5's column No.9. The site is regulated under the Control of Major Accident Hazards (COMAH) Regulations 1984.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Environmental Assessment Site Investigation Factual Report, Nechells Gas Holder Station (Mentor No. 006731)

SITE LOCATION:	Nechells Place, Birmingham

DATE PREPARED	October 2002	**DATE REVIEWED**	06/09/13

AUTHORED BY:	Parsons Brinckerhoff	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Lattice Property Holdings Ltd (LPH) commissioned Parsons Brinckerhoff Ltd (PB) to undertake an intrusive ground investigation of the Gas Holder Station at Nechells Place, Nechells, Birmingham.

The site (2.33 ha) comprises various Transco utilities including: two large gas holders, which occupy the central area of the site, governor houses, various above ground gas pipes, pressure reduction systems, instrument rooms and a boiler house. The current site forms only a small part of the historic gasworks; the main gas production and process areas were to the south and east of the current holder station. The current site appears to have been used for gas storage and transmission although some historic process plant impinges upon the current eastern site boundary.

The following reports have previously been prepared for this site (none available). Parkman's desk study appended numerous additional reports/data dated from between 1978 and 2001 related to the site and its surroundings:

- Environmental Assessment Desk Study Report, January 2000, prepared by Parkman Environment.
- Boundary Survey, January 1994, prepared by Travers Morgan incorporated within the above desk study
- Spectrasite Investigation Report, Celtic Technologies, October 2001.

The principal objectives of the investigation were; to identify the nature and extent of potential soil and groundwater contamination. The investigation incorporated information from previous reports where applicable.

SCOPE OF REPORT

Environmental Management Plan

CONCLUSIONS

The site operated as part of the Saltley and latterly Nechells Gas Works from at least 1881 to date. The first gas holder (No. 5 Holder) appeared by 1881 and the second (No. 6 Holder) by 1905. Early development (up to 1920), included buildings along the southern boundary, railway sidings within the eastern boundary and a retort house part of which impinged upon the eastern boundary. Post-1920 development included a power house, workshops and engine shed in the southern corner of the site, cooling tower and booster house near the eastern boundary. By the early 1980s many of the original structures had been removed. In the early 1990s new buildings are shown and include a gas governor and control kiosks. The remainder of the gasworks existed to the north, east and south, these areas formally contained

significant process plant and equipment and have since been re-developed mainly for industrial/commercial use. In the early 1990s there were reports of cracks within the base of Gas Holder No.6 and the dumpling the result being the loss of water at approximately 30,000 l/day. Despite attempts to reduce the leakage it is understood to have been on-going to at least the year 2000 and is understood to continue. The tank for Gas Holder No.6 is 12.8 m deep.

Site inspection revealed visual evidence of surface contamination: Oil staining was clearly visible around the base of Gas Holder 5; anecdotal evidence suggests that this staining is caused by the overtopping of the gas holder seals. Approximately 25 mm of oil was noted on the surface of one of the seals. A small amount of builder's debris was noted lying within the westernmost compound.

The site is underlain by Made Ground, Glaciofluvial Deposits and Sherwood Sandstone. The Glaciofluvial Deposits comprise yellow/orange/brown sands and gravels with cobbles (deposited within the Proto Tame Valley, hence the significant thickness of 15-30 m). The Sherwood Sandstone is predominantly comprised of sandstone with subordinate mudstone bands. The Glaciofluvial Deposits are classified as minor aquifer. The River Rea runs in a northerly direction approximately 70 m east of the site and is classified by the EA as having a General Quality Assessment (GQA) of Grade E (poor). The Grand Union Canal is approximately 100 m to the east of the site and has been assigned a GQA classification of grade E (poor). The mean annual rainfall for the area is 793 mm per year.

The previous reports/data appended in Parkman's desk study are briefly summarised and essentially highlighted numerous elevated contaminants have been encountered previously on site including toluene extract, phenols, total cyanide, sulphate, ammonia, PAHs, organic extract, lead, copper, zinc, arsenic, cyanide Investigation undertaken along the western site boundary by Travers Morgan Environment (December 1993) indicated Made Ground up to a maximum thickness of approximately 2 m; perched groundwater was only noted in one of the eight trial pits immediately north of Holder No. 6 at approximately 2.5 m below ground level (bgl). Celtic Technologies (October 2001) encountered Made Ground in the western area of the site to a maximum of 1.5 m bgl

The investigation comprised the excavation of 31 trial pits (19 mechanically excavated and 12 hand excavated) and 7 boreholes and 19 window sample holes. Made ground was encountered at all locations ranging in thickness from between 0.30 m to 4.80 m. Visual and olfactory evidence of possible contamination within the Made Ground was identified in a number of trial pits and boreholes including hydrocarbon odours, staining, free product, possible spent oxide waste, possible asbestos, foul lime, coal, coke, clinker and ash. Glaciofluvial deposits (approximately 10 – 17 m thickness) were encountered to a maximum depth of 20.6 m bgl overlying the Sherwood Sandstone. Olfactory and visual evidences of possible contamination within the Glaciofluvial Deposits (generally hydrocarbon odour/staining) was identified in some of the exploratory hole locations. There was no olfactory or visual evidence of hydrocarbon contamination in the Sherwood Sandstone. Significant underground structures and foundations along with a number of below ground cables and pipes were identified during the investigation.

Oily sheens and hydrocarbon odours were noted on the purged samples. Monitored groundwater was encountered between 2.21 m bgl to 8.08 m bgl (present within the Glaciofluvial Deposits at between 92 m AOD and 95 m AOD indicating flow to the east at a gradient of approximately 1.3°, although this is likely to be complicated by buried structures and abstraction from the EA borehole on site). High concentrations of methane were recorded on site from WS6 (>145.7%) and WS16 (>138.1%). The presence of these high concentrations of gas is suggestive of leakage from existing gas pipes. Maximum CO_2 was 9.3%.

This is a factual report only and so no interpretation of the results is available, however a brief scan of the hard copy results available indicates some localised elevated concentrations.

A letter from ATKINS to Paul Burn (BCC EPO) dated 7th March 2006 is included stating that, as discussed, they are in the process of determining the final reclamation strategy prior to re-development and would appreciate Paul's view regarding the previous ground investigation and validation reports attached (assume based on wording that this refers to contents of the disc (i.e. relating report review refs 085, 086, 087 and 088). Paul replied by e-mail (14th March 2006) to highlight that the reports presented represent factual information regarding the investigation of the site and subsequent remediation works and that BCC would wish to see an appraisal (using agreed relevant human health/groundwater assessment criteria) of the information regarding post remediation site conditions in the context of the intended use. In addition, Paul noted that the 2002 investigation identified elevated ground gases but no evidence is presented as to post remediation ground gas levels and no assessment made as to whether mitigation is needed. Also, post-remediation groundwater monitoring has indicated that many analytes exceed the drinking water standards – Paul questioned whether further assessment/remediation was planned and whether the EA had been consulted.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Moderate

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Close-out Report for Infilling of Gasholder Tanks GH5 & GH6 at Nechells, Birmingham

SITE LOCATION:	Nechells Place, Birmingham

DATE PREPARED	October 2004	**DATE REVIEWED**	06/09/13

AUTHORED BY:	Parsons Brinckerhoff	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

This report comprises of a letter sent to SecondSite Property Holdings Ltd relating to the close-out of the infilling of gasholder tanks GH5 and GH6.

SCOPE OF REPORT

Close-out Report

CONCLUSIONS

The letter states that Parsons Brinckerhoff Ltd (PB) authorise the close-out reports on the infilling of gasholder tanks GH5 and GH6 produced by Edmund Nuttall Ltd and enclosed as part of the document. The tanks still remain, but have been fully cleaned of water, oil and sludge removal under technically challenging conditions.

The high water table required dewatering of the surrounding sandstone as much as 2 m adjacent the holder and to full depth of the inner dumpling to enable safe access for cleaning. This water was cleaned prior to disposal to sewer under discharge consent. Some clean-up of the waters on site will have been achieved as a result. Recent final monitoring of waters has been undertaken to show current conditions of groundwater quality.

Lowering of the terrace of holders by as much as 4 metres has produced a level site to enable future redevelopment. Use was made of the puddle clay linings to the holders, brick holder walls, concrete walls and thrust blocks, which were crushed to form granular materials to dress the site and for infill. Services have been rationalised to assist future development. Care was taken to minimise impact to kestrels nesting on holder No.6, by re programming the dismantling operation slightly to accommodate fledglings until leaving the nest.

Sludge in the annulus of each holder was removed and disposed of to a licensed treatment facility.

The well decommissioning followed EA Guidance and a revocation of the abstraction licence was obtained. It was backfilled with pea gravel after pump removal to 2 m below ground level (bgl). The remainder was formed as a concrete plug. The revocation license is enclosed as part of the report.

Japanese knotweed on site exists and will require active management by treating with an appropriate herbicide (Glyphosate or 2,4-d Amine) twice during the July to September growing season and for up to 3 years. Some stands were excavated and rhizomes placed in the base of the holder No.6 below the 5 m minimum depth (and covered with a geotextile). Several stands exist in the Saltley area and on the adjacent site so full eradication may not be possible.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low/Moderate (slight reduction on risk from before as a result of close-out)

HS2 WEST MIDLANDS – LAND QUALITY
REPORT REVIEW PRO FORMA

REPORT TITLE:	Land Remediation Programme 2003, Nechells Holder Station, Birmingham, Environmental Improvement Works, Validation Report, Volumes 1 – 3 (Mentor No. 006731)

SITE LOCATION:	Nechells Place, Birmingham

DATE PREPARED	February 2005	**DATE REVIEWED**	06/09/13

AUTHORED BY:	Parsons Brinckerhoff	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

Parsons Brinckerhoff Ltd (PB) was appointed by SecondSite Property Holdings Limited (SPH) as the Engineer for the remediation work at Nechells Holder Station, Nechells. This appointment was made under the 2002/2003 Term Consultancy Contract in accordance with SecondSite Property Holdings Limited's Purchase Order 677720. Various environmental liability assessments and investigations have previously been undertaken in relation to the site.

PB carried out an intrusive ground investigation from the 13th – 27th May 2002 (detailed in report review reference 086).

The most recent ground investigation of August 2003 comprised thirty-two trial pits round the perimeters of Gasholders No.5 and No.6. This investigation was designed to achieve pre-chemical validation testing of the proposed cut volumes. The excavation records, chemical results and geotechnical results from this investigation can be found in Appendices 4 & 5 of this report.

A brief summary of the site history and setting is summarised in report review reference 086.

The BCC site investigation summary sheet states 'Transco distribution infrastructure on part of site' – it is assumed this is referring to the land use reference number 98.

SCOPE OF REPORT

Environmental Improvement Works, Validation Report

CONCLUSIONS

The environmental improvement scheme has been designed to ensure reduced levels at the site and site won material used for infilling Gasholders No.5 and No.6 do not pose an unacceptable risk to humans, ecology, property and controlled waters, with respect to a commercial end-use at the site. The conceptual model was developed using chemical validation results of the proposed cut areas, determined during the investigation of August 2003. The Transco compounds were not part of the environmental improvement works. No boundary migration issues are evident.

The conceptual model identified the main receptor to be controlled waters (underlying major aquifer) with the pathway being partly restricted leaching of contaminants from the excavated soils via cracks in the holder bases to controlled waters. The key driver for remediation was therefore leaching of contaminants from Made Ground to groundwater. For the secondary receptor, an assessment has been made of human health risk for the upper 1 m of the final profile.

The remedial works commenced on 26th January 2004 and were completed on 24th March 2004. The environmental improvement work was referenced into Areas 1 to 11. Areas 1-6 were identified during the pre-chemical validation

testing of the proposed cut volumes. Areas 7-11 were determined from the site investigation of May 2002. All the chemical validation samples taken from the excavation areas were found to be below the acceptance criteria. 2740 tonnes of non-hazardous waste and 180 tonnes of hazardous waste was removed to landfill. Other works included the closure of the well on site and management of Japanese knotweed.

No groundwater remediation has been completed at the site. Following significant de-watering of the holders the current situation of groundwater quality indicate it to be free of product.

In addition, a conceptual model for the remainder of the site was developed with a commercial end-use. This identified areas that posed a potential risk to human health. These areas were included in the environmental improvement scheme and required chemical validation testing.

Three rounds of groundwater monitoring were undertaken between October and December 2004. Observations indicated that there was no free product present.

Japanese knotweed found at the site was treated in accordance with the Environment Agency's Code of Practice for the Management, Destruction and Disposal of Japanese Knotweed, Version 1. This involved thoroughly spraying the knotweed with a herbicide twice during the environmental improvement works. Where excavation was possible, the knotweed and surrounding soil were excavated after having been sprayed and placed at 12 m depth in gasholder GH6. Infill material and a heavy gauge polythene sheet were placed above the knotweed.

Two operational Transco areas are to be retained in the south and east of the site. There must be shared vehicular access included in any development.

PB stated that the site is suitable for its future use.

Note: BCC Site Investigation Summary sheet notes that post-remediation groundwater analysis shows some contamination above DWS. Remediation targets and strategy not agreed with Birmingham City Council in advance. Similar points are highlighted in Paul Burns' (BCC EPO) response to ATKINS' later dated 7th March 2006 regarding the final reclamation strategy. This response is detailed further in report review reference 086.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low/Moderate (still potential issues as highlighted by BCC's note that post-remediation groundwater analysis shows some contamination above DWS)

HS2 WEST MIDLANDS – LAND QUALITY REPORT REVIEW PRO FORMA

REPORT TITLE:	Environmental Statement – Beorma Quarter: Soils, Geology and Contamination (Ref: 67C12098)

SITE LOCATION:	Beorma Quarter, Digbeth

DATE PREPARED	April 2009	**DATE REVIEWED**	19/09/13

AUTHORED BY:	Environ UK Ltd	**REVIEWED BY:**	Land quality project team

REPORT CONTEXT

This report comprises of the Soils, Geology and Contamination section of an Environmental Statement prepared in relation to proposed development to be undertaken at the Beorma Quarter site in Digbeth, Birmingham. Although the section does not mention the details regarding the proposals, internet searches indicate that the proposed finished scheme will comprise offices, leisure and retail space, a hotel and public square, with the centrepiece of the development being a 27-storey tower; Phase one of the development will include the refurbishment of the grade II-listed cold storage building on Digbeth High Street into offices with ground floor retail and restaurant space.

The report discusses the historical and current use of the proposed development site in relation to the potential for soil and groundwater contamination to exist and the underlying geology and hydrogeology. It details the objectives, methodology and findings of a Phase 1 Desk based review including a review of previous site investigation data, a Phase II intrusive site investigation, conducted by CSP and ENVIRON in 2007, and also considers the potential impacts of disturbance of the soils on the site associated with the redevelopment proposals.

The site dates back to medieval times when the town of Birmingham was first developed. Whilst the original uses of the site had limited potential to leave pollutants behind the more recent post industrial revolution development may have resulted in pollution of the soils and groundwater at the site.

The intrusive investigation was undertaken by CSP and ENVIRON during the period 14th January 2008 to the 5th February 2008, with subsequent periods of sample analysis, monitoring and assessment of results. Data were supplemented by the collection of some shallow soil samples during the excavation of a number of archaeological trial trenches preceding the site investigation throughout November and December 2007. The field site investigation comprised of 9 No. rotary boreholes, 6 No. shallow window sample holes, 1 No. trial pit

The report provides a review of one previous report (the full report is not available) referenced as follows: Well Lane, Digbeth – Factual and Interpretive Report on Geotechnical and Environmental Ground Investigation, Birmingham City Council, October 1994 (Report Ref 114247). The report focussed on the north eastern part of the site. Made Ground was encountered to depths ranging from 1.30 m below ground level (bgl) to 2.40 m bgl, although concrete slabs (possibly former basements) were encountered at the base of trial pits up to 2.40 m bgl. Glacial drift deposits were encountered at one location (1.40 m bgl to 2.20 m bgl). Weathered Bromsgrove Sandstone was encountered between 2.20 m bgl and 4.40 m bgl, whilst completely weathered Mercia Mudstone was encountered from between 1.30 m bgl to 3.50 m bgl. Standing water levels ranged from 1.5 m bgl to 2.00 m bgl in BH2. All other strikes/seepages were recorded within 5.00 m of the ground surface. Comparison of soil data against present day residential without plant uptake criteria indicates no significant widespread contamination with only localised lead (2 samples) and total PAH exceedances (1 sample). Elevated ammoniacal nitrogen, antimony, boron, manganese and nickel were identified in groundwaters against Drinking Water Quality guideline criteria. Gas monitoring indicated maximum concentrations of methane of 0.2% and carbon dioxide 11% and minimum oxygen of 5.7% (all BH2). It was noted that based on these results, some degree of risk assessment regarding gas protection measures would be necessary. The development works, however, will involve large scale removal of site soils (Made Ground) down to natural levels which will also more than likely remove the organic matter in soils that is probably giving rise to the gas levels observed.

SCOPE OF REPORT
Soils, Geology and Contamination Chapter of Environmental Statement

CONCLUSIONS
CSP and ENVIRON's 2007 investigation encountered Made Ground to maximum depths of approximately 2.5 m, underlain by Head deposits (0.30 – 0.90 m thick) over Bromsgrove Sandstone/Mercia Mudstone. Groundwater monitoring indicated levels generally between 0.75 m bgl (BH8) to 2.90 (BH9), although one anomalous recording of 6.80 m bgl was recorded in BH1. Minor visual field evidence of potentially contaminated materials was noted in the form of frequent gravel size fragments of brick, concrete and clinker throughout the Made Ground (although no olfactory or visual field evidence of hydrocarbon odours, hydrocarbon contamination (oily stains) or hydrogen sulphide odours were noted, neither were they during groundwater monitoring). Localised asbestos-containing materials (crocidolite and chrysotile) were observed within Trench 4 of the archaeological trial trenching exercise. All headspace readings for VOCs were recorded below the detection limit of the instrument. Concentrations of methane ranged from non-detectable (<0.1% v/v) to 0.4% v/v (BH5). Maximum carbon dioxide was 9.1% v/v (BH5). Depleted oxygen coincided with the elevated carbon dioxide and/or methane levels. Hydrogen sulphide concentrations ranged between <1ppm and 1ppm (BH5, BH7 and BH8). Carbon monoxide ranged between <1 ppm and 5 ppm (BH5). Flow rates in the four wells ranged between -0.7 l/hr to + 4.0 l/hr over the monitoring period. The site is classified as 'Characteristic Situation 2', i.e. low risk (gas protection measures may be necessary, but note anticipated removal of large volumes of the Made Ground thus removing source reducing risk from low to insignificant). Soil results confirmed localised exceedances for arsenic, lead, PAH and hydrocarbons, whilst localised hydrocarbon and sulphate exceedances were recorded in groundwater. The nature and level of contaminants identified at the site although low to moderate are not considered to pose a significant health risk to current occupants (i.e. commercial and managed residential end-use with high-rise housing above). Similarly the contaminant levels identified do not represent an on-going source of groundwater contamination. What little pollutant source does exist will more than likely be removed from the site by the excavations associated with the basement construction and general site earthworks. Furthermore, the completed site will be covered with hardstandning which will prevent infiltration and percolation of rainwater (and hence minimise leaching) and break the direct contact pathway to humans. The report highlights other construction implications (e.g. shallow groundwater, machinery maintenance) and the need to assess any significant contamination identified as works progress. Given the historical uses of the site and the low level of soil/groundwater contamination identified to date, ENVIRON does not consider that further works are necessary to characterise the areas that are currently inaccessible. The contaminant levels observed are inconsequential as far as the development is concerned and the development proposals will have an insignificant impact on soil/groundwater quality as there will be no polluting activities associated with the development.

POTENTIAL FOR LAND QUALITY ISSUES AT THE SITE	Low